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26  
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3431

# **Machine Gun Handbook** (Technical)

**Volume I, Pamphlet No. 1**

**Vickers .303-in. and .5-in. Machine  
Guns and Appurtenances**

**1940**

**Printed under the Authority of HIS MAJESTY'S STATIONERY OFFICE  
by William Clowes & Sons, Ltd., London and Beccles.**

Serial 1940 #22

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By Command of the Army Council,

*A. J. G. G.*

THE WAR OFFICE,  
17th July, 1940.

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Gunen Maschinen

Polstenen

## CHAPTER I

### 1. History

The Vickers .303-in. machine gun was adopted by the British Government at the end of 1912 (para. 16217 L. of C.). It replaced the Maxim gun which was in general use at that time and which had been found to be heavy for field work.

The present Mk. I pattern gun differs only in minor details from that originally introduced.

With the introduction of armoured fighting vehicles (A.F.Vs.) various experiments were carried out with machine guns as armament and the water-cooled Vickers gun was found to have many advantages over early air-cooled guns. The Mk. I .303-in. Vickers gun was mounted in various vehicles and gave years of satisfactory service, but with the advance in design of mountings the method of securing the Mk. I gun was found to be inconvenient and experiments were carried out with modified guns having a dovetailed mounting base riveted to the underside of the gun. After a series of trials the Mk. IVA and IVB .303-in. guns were approved and supplies obtained by factory conversion of Mk. I guns. From experience with these a number of improvements were embodied in the Mk. VI gun.

The cooling of machine guns in A.F.Vs. was then found to be inefficient for sustained firing and a header tank cooling system was adopted to circulate the water in the gun casing. This introduction necessitated a modification which led to the introduction of Mk. VI\* and VII guns, the former being converted from Mk. I guns and the latter of new manufacture.

As the design and armouring of A.F.Vs. advanced, it became necessary for the inclusion of a weapon firing a bullet with greater penetrating power than the .303-in. service bullet.

Trials and experiments were carried out with a number of Mk. I .5-in. Vickers guns mounted in M.G. carriers and a modified design (Mk. II) was evolved and mounted in dual mountings in armoured cars. The non-interchangeability of these guns with the .303-in. guns, due to the difference in size of the mounting slide, was considered a disadvantage and led to the design of the Mk. IV gun having a similar base to the .303-in. gun. Owing to breakages only a few of these guns were manufactured and a strengthened pattern, the present Mk. V, was produced, certain components being re-designed.

*Note.*—The Mk. II, III and V .303-in. guns are special to Air Ministry requirements.

The Mk. III .5-in. gun is special to Naval requirements.

## CHAPTER II

## THE GUNS

GUNS, MACHINE, VICKERS, .303-IN., Mk. I

## 2. General description

The gun is recoil operated, the barrel being cooled by water in the barrel casing. It is belt fed and fires normally at a speed of approximately 500 rounds a minute. A description of the various components of the gun is given below.

## 3. Description of non-recoiling portions

*Barrel casing.—Exterior.*—The barrel casing is of steel, with longitudinal corrugations for strengthening purposes.\*

On the front end of the barrel casing is fitted the Mk. I muzzle-attachment. The outer casing of the muzzle-attachment is a hollow cylinder screwed internally at the front end to receive the front cone. It is bored and grooved at the rear end to form an inner flange interrupted for connection with the gland, which has an outer flange correspondingly interrupted to engage with it.

Vents, for the escape of gases, are cut near the front end of the cylinder.

A split pin, attached to the outer casing by means of a chain connection, can be entered in any one of three holes bored at equal distances in the outer casing for engagement with any one of three corresponding holes in the gland.

The disc is pressed home on the front cone before the latter is screwed into the outer casing.

The Mark II front cone is bullet-proof and unlike the Mark I, is conical at the front.

To prevent the escape of water there is at the forward end of the barrel casing, asbestos packing, held in position round the barrel by the gland which is screwed into the front end of the casing.

The gland and front cone have flanges which are grooved to receive the combination tool provided for assembling and stripping purposes.

\* Uncorrugated casings will also be met with; these are made of thicker material to give the same strength.

Above the gland is the screwed head of the No. 1 steam tube, which is retained in position by a Mk. I keeper screw.

On top of the barrel casing is the foresight. It is  $\frac{5}{8}$ -in. to the left of the axis of the barrel to align with the backsight in order to make the lines of sight and fire parallel. It is protected by side wings, formed on the block fixed to the casing, into which the foresight is dovetailed. There is an opening in the right wing, through which the foresight is assembled, and a hole for a punch in the left wing for adjusting and removing.

A cork plug is provided, which is inserted in the steam escape hole when the gun is travelling, in order to prevent waste of water.

The cork plug fits into a special fitting made to receive a condenser tube. This fitting is provided with an Adapter, condenser, Vickers .303-in. M.G., Mk. I to which the condenser tube can be quickly assembled.\*

On the underside of the barrel casing is a hole for drawing off the water. This is closed by a No. 1 screwed plug.

A hole for filling the barrel casing with water is provided at the top and is also closed by a No. 1 screwed plug. The hole is placed slightly to the side in order to prevent the casing being completely filled, which might lead to damage during frosty weather, and also to prevent the steam tube being fouled by the filler.

At the rear end is a sleeve, through which the barrel passes on being assembled, and this forms the rear barrel bearing.

When the gun is assembled the front of the barrel block bears against the face of the barrel bearing. At the rear end of the casing are the barrel rests to give support to the barrel through the side-plates.

There is a seating for ejection on the bottom of the barrel casing which ensures the empty case being knocked off the extractor should it fail to drop off before the extractor is in a position to rise.

Under the rear end of the casing is a bracket to take the cross-head joint pin which secures the gun to the mounting.

*Barrel casing.—Interior.*—Is tinned to prevent rust and holds about seven pints of water.

The water begins to boil after about 600 rounds have been fired continuously. If rapid firing is continued the amount of water evaporated is about  $1\frac{1}{2}$  pints for each 500 rounds. It will take from three to four hours for a full barrel casing of boiling water to cool to air temperature under normal European weather conditions.

\* For early patterns of condenser tubes the adapter is replaced by a protector when the condenser tube is not connected to the gun.

At the front end is a gunmetal guide to lead the barrel through the front of the casing when the barrel is being replaced after stripping. It forms a bearing for the barrel and at the same time a seating for the asbestos packing.

Leading up to this guide and extending rearward is a brass trough, which fits into the bottom central corrugation of the casing, being riveted to the casing at each end. A few guns have a short trough at the front end only. The object of the trough is to facilitate assembling and to prevent the tinned surface of the casing being scratched off by the muzzle of the barrel.

The No. 1 steam tube, which is of brass, consists of a fixed tube and an outer tube (termed the slide valve), so arranged as to slide freely along the fixed tube. In the fixed tube there is a hole near each end, and in the threaded portion in front a third hole, which connects with the steam escape hole by a tube attached to the interior of the barrel casing. The steam tube is screwed into the front end of the barrel casing, and is retained in position by a Mk. I keeper screw, which ensures the third hole being in alignment with the steam escape hole. At the breech end it fits into a socket fixed to the rear end of the barrel casing.

If the gun is fired with elevation the valve slides backward and, closing up to the hole at the rear end of the tube, prevents the water from entering. At the same time the front hole is left uncovered and, being above the water level, allows the steam to enter the tube and escape through the steam escape hole in the barrel casing. Similarly, if the gun is fired with depression the valve slides forward and allows the steam (but not the water) to escape through the rear hole. When the gun is horizontal either one or both holes are uncovered by the valve.

*Breech casing.—Exterior.*—The breech casing which is riveted to the barrel casing consists of:—

Two outside plates (right and left).

A bottom plate.

The rear-crosspiece.

Two covers (front and rear).

*Right outside plate.*—Is cut away to enable the feed block to be inserted in the gun. The left outside plate is similarly cut away.

To the outside of the right plate is riveted the check lever bracket, on the outside stud of which the check lever pivots. There are two patterns of bracket, Mk. I and Mk. II. The Mk. I bracket is grooved on the inside face to fit over the rib

on the lightened pattern of plate, whilst on the Mk. II two studs are formed for engagement in holes bored in the unlightened plate. A few brackets of the Mk. II pattern have only one stud; these have not proved satisfactory, some having been found to work loose. Such should be replaced where necessary by the later pattern, which requires fitting by an armourer, in accordance with para. 17,743 L. of C. The early pattern of Mk. I bracket has a second stud on the outside, which was provided as a bearing for a check lever piston with spring.\* In brackets of later manufacture this second stud is omitted. The check lever is secured to the outer stud by a keeper pin, the stud being grooved for the pin, necessary clearance being allowed for the movement of the check lever and pin.

At the rear end of the plate a slot is cut in which one of the crank bearings slide. The slot is partially closed by a Mk. I, No. 1 slide which carries a roller. The roller is kept in position by a collar and split pin.

At the extreme rear end are two holes, the upper for the threaded end of the Mk. I "T" fixing pin and the lower for the Pin, joint, rear-crosspiece, Mk. I.

*Left outside plate.*—On the outside of the plate are two studs for holding the front end of the Mk. I fusee spring box; a third stud for holding the rear end is fitted on the Mk. I, No. 2 slide.

The fusee spring box contains a strong spiral spring called the fusee spring (Mk. I), the rear end of which is connected with the crank by the fusee chain and fusee. The front end is attached to the breech casing by means of the fusee spring box and Mk. I adjusting screw, which passes through the front end of the box, and through the nut at the front end of the spring.

The fusee spring can be adjusted without removing the box as the vice pin of the screw is loose. This screw is kept in position by two nibs which enter recesses in the front end of the box and are retained by the tension of the fusee spring.

At the front of the feed block gap is the Mk. I front cover catch for securing the front cover.

This catch must be turned up in order that the cover may be opened. The catch, when down, is kept in position by a plunger, plug and spring.

At the rear end of the plate a slot is cut in which one of the crank bearings slide. The slot is partially closed by the Mk. I, No. 2 slide which carries the stud for the fusee spring box.

\* Earlier No. 1 pattern check levers were fitted with a piston and spring now obsolescent. A No. 2 pattern is now supplied. This is longer and heavier at its upper end.

At the extreme rear end two holes are provided for the "T" fixing pin and crosspiece joint pin.

On the underside is the elevating stop. Without this it is possible for the crosshead of the Mk. IV tripod mounting to damage the fusee spring box.

*Bottom plate.*—There is an opening in the plate through which the empty cartridge cases fall to the ground. This opening has a sliding shutter which, when shut, prevents dirt, etc., from entering the gun. The shutter must be moved to the rear before the gun can be loaded. If the shutter is closed after loading only one shot can be fired; but the empty case will remain in the breech casing and another cartridge will be fed up; the extractor dropping on to the shutter will prevent the lock from going forward. The shutter is secured by a catch, with thumb-piece, plunger and spring.

Under the plate is the elevating bracket, to take the elevating joint pin, which secures the gun to the elevating gear.

*Mk. I rear-crosspiece.*—The outside plates are connected at the rear end by the rear-crosspiece which is hinged at the bottom by a Mk. I screwed joint pin and fixed at the top by the Mk. I "T" fixing pin. The rear-crosspiece is fitted with grips of wood, inside which are steel cylinders for carrying oil (closed by milled heads fitted with a brush and leather washer), firing lever with thumb-piece and pawl, safety catch, and safety catch piston and spring.

*Mk. I\* front and Mk. I rear cover.*—The two covers are both hinged on one joint pin attached to the outside plates just behind the feed block. The Mk. I pin is secured by a check nut with keeper pin; the Mk. II pin is  $\frac{1}{8}$ -in. longer and has a slotted nut retained by a split pin.

The joint also forms a tie for the outside plates.

On top of the rear cover is the tangent sight which is positioned by a piston and spring. The sight, when down, rests on a bridge which is solid with the rear cover and strengthens it.

*The tangent sight* consists of a Mk. II stem, a Mk. I, No. 2 graduated plate marked up to 2,900 yards, and a slide.

The tangent sight stem is provided with a fixed aperture sight, the aperture being bored in a semi-circular flange formed on the left of the stem at the rear end. It is sighted for a range of 400 yards and is for use when the stem is horizontal. A rack for engagement by the pinion of the slide is cut along the face of the stem on the right. The graduated plate is secured on the left of the face by upper and lower fixing screws.

The Mk. II slide is divided into two parts by a longitudinal saw cut. The two parts, having the pinion wheel pivoted between them, can be clamped to the stem by means of a clamping nut on the right in order to fix the slide in the desired position and to prevent it from being jarred down during firing.

The sighting U is formed in a blade which projects on the left of the left part of the slide.

The pinion is provided for the purposes of finally positioning the slide after the latter has been moved into the approximate position desired. The Mk. II\* slide differs from the Mk. II † in that an aperture pillar is fitted to the blade to replace the U sighting, a large semi-circular opening being cut in the position of the original U in order to expose the whole of the sighting portion of the pillar. The Mk. II\*\* differs from the Mk. II\* in that the right-hand portion is fitted with a friction spring to improve the grip on the stem, a spacing washer is fitted between the pinion and the same portion, and the clamping nut, designated No. 2, is fitted with a thumb-piece. The Mk. III slide differs from the Mk. II\*\* in that the body is solid; the sighting extension on the left is extended to the upper edge of the slide and has a window opening into the lower end of which the aperture pillar is fitted, the head being thus protected by the surrounding wall. A locking device with quick-release is provided on the right for the pinion. The pinion is extended and formed with a cylindrical head, on the outer face of which teeth are cut all round to engage a toothed segment on the inner face of a cover screwed to the body and fixed by a screw. The pinion is pressed into engagement with the segment by a spiral spring thus locking the pinion. The release of the pinion is effected by a press cap with stop button and screw; the cap on being pressed inward causes the pinion to be pushed out of engagement with the segment by the point of the screw. A spring washer is fitted under the press cap to maintain tension on the button and prevent the screw from working loose.

*Breech casing.—Interior.—Front and rear covers.*—The front cover has two claws which are engaged by the stem of the front cover catch. It also has an extractor stop, which acts in conjunction with the extractor stop on the lock casing, in order to prevent the extractor from rising too high.

On the inside of the rear cover is the cover lock spring which actuates the rear cover lock.

The trigger bar slides inside the rear cover. This has a lug on the right, against which the trigger bar spring bears, and

† The Mk. II, II\* and II\*\* slides are obsolescent.

a projection on its rear end which engages the head of the trigger bar lever. In the front section is a slot in which the tail of the lock trigger slides when the lock is moving backward and forward.

The front end of the slot engages the tail of the lock trigger and draws it back when the trigger bar is drawn to the rear by pressure on the thumb-piece. The trigger bar is kept in position by means of projections on the lock guides of the rear cover.

There are two ramps fixed inside the rear cover which force the extractor down when the moving portions recoil.

The rear cover and rear-crosspiece are grooved to fit over the edges of the breech casing, so that when the "T" fixing pin is home and the cover is locked, these, with the assistance of the screwed cover joint pin, keep the casing and cover rigid.

*Right and left outside plates.*—On the inside of both plates are cams which control the path of the extractor. These cams each have a step cut in the rear sloping surface for the purpose of preventing the lock going forward if, owing to insufficient recoil, the recoiling portions do not come back far enough to allow the extractor to drop. They are also the means of hanging the lock.

*Mk. I rear-crosspiece.*—Inside the rear-crosspiece is the trigger bar lever, which, pivoting on the "T" fixing pin, draws back the trigger bar.

The trigger bar lever is actuated by pressure on the thumb-piece and returned to its rest position by the Mk. I safety catch spring when pressure is released.

#### 4. Description of recoiling portions

*Mk. II muzzle cup.*—The muzzle cup is bored and threaded at the rear end to screw on to the end of the barrel.

*Mk. II barrel.*—At the rear end is a cannellure, filled with asbestos packing, which prevents the escape of water. At the breech end it is formed with a square block from which project two studs (one at each side) called the barrel trunnions. By means of these trunnions the barrel is connected to the side-plates.

The front of the barrel block bears against the face of the barrel bearing in the barrel casing.

The interior of the barrel is rifled, and has five grooves and lands with a left-handed twist.

In front of the cartridge chamber is the lead, which forms a funnel to guide the bullet into the rifling. The bore, rifling, and chamber are the same as in the barrel of the service rifle.

*Mk. I, No. 1 side-plates.*—The side-plates are both bored to receive the barrel trunnions and have guides along which the flanges of the lock move. These guides have two interruptions on each side to enable the lock to be lifted out. In addition each side-plate has a bearing, through which the crank passes, thus connecting the latter with the barrel. These bearings move in slots in the breech casing.

Both side-plates are fitted with springs to ensure that the horns of the extractor do not drop below the solid cams during the backward movement of the lock when no cartridge is on the extractor.

At the rear end are extensions for the exclusion of dust, grit, etc.

The left side-plate has a prolongation at the front, with a recess in which the stud of the bottom lever of the feed block engages.

*Mk. I crank.*—Is fitted with a connecting rod which is free to rotate on the crank pin. Outside the breech casing on the right is fitted the crank handle, the upper surface of which bears on the roller when the gun is firing. On the left the fusee is assembled, having a chain of two links, by means of which it is connected to the fusee spring. The fusee is attached to the crankshaft by means of a stem and lugs and is easily removed. A number of cranks are drilled for inspection of the barrel from the rear when the rear-crosspiece is lowered. These are known as Mk. IA cranks.

*Connecting rod.*—The connecting rod is attached to the crank by means of an axis pin called the crank pin, and is arranged to retain the lock by means of an interrupted flange, thereby connecting the crank and lock. It has an adjusting nut, and washers are provided which enable its length to be increased. By this means the space between the extractor and the barrel can be adjusted, thus preventing cartridge case separations.

*Mk. I breech lock.*—The lock is attached to the connecting rod by the side lever head, and when in the firing position closes the breech. In this position it is held by the side levers, the crank (fixed in bearings in the side-plates) and the connecting rod. The connecting rod and side lever head are slightly below the horizontal to prevent the breech from being opened at the moment of firing. The lock has a reciprocating motion communicated to it by the rotation of the crank, and is kept in position during its backward and forward movements by means of flanges working along guides on the side-plates, and by the guides on the underside of the rear cover.

The lock casing has a piece riveted inside at the top of the front face which acts as a guide for the lock spring when the lock is being assembled, and also forms a seating for the spring. Its sides are drilled for the various axis pins, and on its underside it has flanges which work on the guides on the side-plates. The lower of these flanges has interrupted portions to agree with those in the guides on the side-plates and allow the lock to be removed from the gun.

The lock casing contains the firing pin, the tumbler and axis pin, the trigger lock and axis pin, the sear and spring and the lock spring.

The No. 2 Mk. 1 extractor is attached to the front face of the lock casing by means of the guide ribs, upon which it slides, and contains the gib, the gib spring and cover.

The projections on the gib, together with the cartridge grooves, form recesses which retain the cartridge in position.

The extractor is moved upward by means of the side and extractor levers. The upward and downward movements of the extractor are regulated by guide ribs and stops. The top stop on the face of the lock casing, acting in conjunction with the stop on the underside of the front cover, limits the upward travel of the extractor, while the bottom stops formed on the sides of the lock casing, on which the extractor levers bear, limit the downward travel.

**Mk. 1 R. H. feed block.**—The feed block is of steel (or gun-metal) and fits under the front cover into a recess cut in the breech casing. It is provided with a slide, to which are attached two pawls with spring, for the purpose of moving the cartridges from right to left. These pawls are made with finger-pieces which can be pressed down together to release the pawls from the belt. The slide has a transverse motion given to it by means of two levers which are fitted together. The top lever has a stud which engages a slot on the slide, and the bottom lever a stud which engages in the recess in the prolongation of the left side-plate. By this means the slide is connected with the recoiling portions. The feed block has also two stationary bottom pawls (actuated by a spring), which are connected by a finger-piece, and engage under the next cartridge and prevent the belt from slipping backward during firing. The feed block is provided with guides fitted above and below in the cartridge way to ensure the cartridges coming to the correct position where they can be gripped by the extractor. The cartridges are prevented from being pushed too far through to the left by means of the cartridge and bullet stops which are inside the feed block.

## 5. Stripping

### Points to be observed

1. Use correct tools, *e.g.*, screwdrivers according to size of screw, correct punches, etc. If this rule is not observed screws get burred and such burrs can only be removed by an armourer.
2. Before attempting to withdraw screwed axis pins, make certain that threads of screw are fully unscrewed.
3. When replacing screwed axis pins do not use force; the threads will engage without using unnecessary pressure. If this rule is not observed the threads (which are extremely fine) will become so burred that it will be impossible to replace the pin, *e.g.*, cover lock screwed axis pin.
4. When raising the rear cover do not throw it upward but lift it, or the hinges are liable to be strained. Before lowering, see that the breech lock is correctly in the gun.
5. Before closing down the front cover see that the feed block is correctly in position and the front cover catch raised.
6. When removing parts secured by chains, do not tug on the chain, which may break, and the part eventually lost, *e.g.*, outer casing split pin, cork plug, screwed plugs, tripod pins.
7. With reasonable care, defects and breakages in machine guns should be of extremely rare occurrence.
8. Direct hammer blows must never fall on any part of the gun. Wood must always be placed over the part to receive blows from the hammer or mallet.
9. In stripping examinations no time limit will be imposed, in order to avoid damage to the gun by careless handling.

## 6. Detailed stripping of the gun

1. The gun is stripped in the following order, the gun being on the mounting.

**Note.**—Operations marked with an asterisk will only be performed by an armourer.

2. **Lock.**—Unload; raise the rear cover, pull the crank handle on to the roller; see that the extractor drops, place the finger between the extractor and stop and lift the lock—at the same time allowing the crank handle to move slowly forward until the lock is released from the side-plates. Give the lock one-sixth turn and lift it out.

3. **Muzzle-attachment.**—Withdraw the split pin. Give the outer casing one-sixth turn and remove it. Unscrew the

front cone, unscrew and remove the muzzle cup. Unscrew and remove the gland and packing.

4. *Feed block*.—Raise the front cover and lift out.

5. *Fusee spring box*.—With the right hand at the rear and the left at the front, press the box forward until clear of the studs, and remove. Disconnect the fusee chain and remove the box and the spring.

6. *Fusee*.—Turn the fusee to the rear until the lugs on the stem are free to be withdrawn.

7. *Recoiling portions*.—Raise the rear cover, unscrew the "T" fixing pin, and lower the rear-crosspiece; remove the Nos. 1 and 2 slides, and draw out the recoiling portions. Disconnect the side-plates from the barrel (removing the left one first).

8.\* *Check lever*.—Drive out the keeper pin from the underside, and take off the check lever.

9. *Tangent sight*.—Unscrew the axis pin and remove. Remove tangent sight, piston and spring.

10.\* *Front and rear covers*.—Remove the keeper pin and check nut, and push out the joint pin.

11. *Front cover catch*.—To remove the spring and plunger, force the plug inward, and give a quarter turn by means of a screwdriver; the plug will then be forced out by the spring. Before removing the plunger it must be turned so that the slots are free to pass the lugs in the catch. \*If necessary, by taking out the keeper pin, the catch can be removed.

12.\* *Rear-crosspiece*.—Remove the keeper pin and check nut, and push out the joint pin.

13.\* *Foresight*.—The position of the foresight should first be carefully marked; drive the foresight out of the dovetail seating through the right-hand opening in the protector.

### Remove the gun from the mounting

14.\* *Steam tube*.—Place the gun on end, so that it stands on the rear end of the breech casing. Remove the keeper screw and unscrew the steam tube. (This should not be removed if the valve is free.)

15. *Sliding shutter*.—Press in the catch, and force the shutter to the front until it is against the stop, press in the plunger with the No. 3 punch, and push the shutter forward until it is clear of the breech casing.

### 7. To assemble the gun

1. Reverse all the foregoing operations, with the exception that the recoiling portions must be replaced before the front packing and gland.

2. When assembling the barrel and side-plates, force must not be used. If the side-plates are not home on the barrel trunnions and crank bearings the barrel must be withdrawn and the side-plates properly assembled, otherwise burrs on the crank bearings may occur.

3. When replacing the gland of the muzzle-attachment, care must be taken to see that it is screwed right home to the barrel casing. When not home the gland is liable to foul the muzzle cup when the barrel recoils, and thus cause damage to the cup; also loss of gas power will occur, as the initial space between the front cone and the muzzle cup will be increased. The split pin which fixes the outer casing of the attachment to the gland should be placed in the bottom hole. When inserting the pin, strict attention must be given to seeing that the pin goes home, and that it has sufficient tension to ensure security; failure to attend to these details may result in the loss or damage of parts of the attachment and injury to personnel.

4. Care must be taken, when re-assembling the steam tube, that the acorn end is inserted into its seating in the barrel casing.

This is more easily assured by keeping the acorn end in contact with the adjacent channel formed by corrugation of the barrel casing.

The tube should screw home freely when in the correct position.

### 8. Stripping various component parts

1. *To strip the breech lock*.—See that the lock is cocked; force out the side lever split pin and axis bush; remove the side levers, extractor levers and extractor. Push out the tumbler axis pin and remove the tumbler. Release the lock spring, push out the trigger axis pin. Remove the trigger, lock spring, firing pin and sear with spring.

2. *To strip the extractor*.—Push out the gib spring cover, and remove the spring and gib.

3. *To assemble the lock*.—Reverse the above, except in the case of the lock spring, which must be forced home, long arm toward the extractor, when the lock is in the fired position, and when all the other parts are assembled.

**Note.**—The firing pin should never be released unless the extractor is up against the top stop.

4.\* *To strip the R. H. feed block.*—Force out the split pin and separate the top and bottom levers; take out the slide and remove the pawls and spring.

Draw out the bottom pawl axis pin and remove the spring and pawls.

*To assemble,* reverse the order of stripping.

5.\* *To strip the rear-crosspiece.*—Unscrew the firing lever axis pin, and remove the firing lever with pawl. Unscrew the safety catch axis pin; remove the safety catch and spring with piston; lift out the trigger bar lever.

*To assemble,* reverse the order of stripping. See that the pawl engages the trigger bar lever.

6.\* *To strip the tangent sight slide.*—For Mks. II, II\* and II\*\* slides, remove the upper fixing screw of the graduated plate from the stem, take out the split pin, unscrew the clamping nut and remove the pinion from the slide. In the case of the Mk. II\*\* slide, remove also the friction spring and washer.

For Mk. III slides, grip the press cap and remove the press cap screw. Remove the press cap and spring washer. Remove the pinion cover locking screw and unscrew the pinion cover. Remove the stop button, pinion and pinion spring.

7. *To strip the No. 1 Mk. I slide.*—Remove the split fixing pin, collar and roller.

8. *To strip the rear cover.*—Unscrew and remove the axis pin of the rear cover lock. Remove the cover lock, cover lock spring, trigger bar spring and the trigger bar.

### 9. Assembling various component parts

*To assemble,* reverse the order of stripping in each case.

GUN, MACHINE, VICKERS, .303-IN., MK. VII

### 10. General description

The Mk. VII gun is designed for use in A.F.Vs. fitted with header tank water circulating system. The gun can be used as may be required with either a right hand or left hand feed block. The operation of the gun is similar to the Mk. I pattern described in this chapter, but various components differ from those of the Mk. I gun as described below.

### 11. Description of non-recoiling portions

*Mk. II barrel casing.—Exterior.*—The barrel casing is not corrugated and is  $1\frac{1}{2}$  inches shorter.

The Mk. VI end cap is re-designed. This has a circular

recess in the periphery to hold the rubber joint ring which acts as a gas check preventing gases passing through the mounting jacket into the interior of the vehicle. The front of the cap is tapped for the foresight screw, and is fitted with detents for positioning the foresight.

The Mk. III foresight is a flat plate fixed by a screw to the front of the end cap; it is pivoted and can be swung down when not in use. A disc spring is fitted on the foresight screw and a split pin in the end cap retains the screw.

The Mk. V muzzle-attachment is an entirely new pattern. The Mk. III gland has a larger hole than the Mk. I pattern, for the passage of the barrel; the threaded portion for screwing into the end cap being correspondingly larger. The front end is screwed for the assembly of the Mk. IV outer casing. Eight holes are equally spaced around the circumference for the escape of the gases; four of these having recesses cut to them to accommodate the tongue of the Vickers .303-in. combination tool. The Mk. IV outer casing, of cylindrical formation, is screwed internally for the gland and has equally spaced slots for the engagement of the combination tool.

Two cups, held together inside the gland and outer casing, form a spherical chamber for gas expansion. The rear cup, which seats in the gland, and the front cup, which seats in the outer casing, are bored for the muzzle of the barrel and the exit of the bullet respectively.

The trunnion block at the rear of the barrel casing is of gun-metal instead of steel and is  $1\frac{1}{2}$  inches longer to compensate for the shorter barrel casing. The block is drilled at the right top for the outlet of water, an outlet bracket being secured to a prepared seating around the hole by three studs, a good joint being obtained by means of a gasket. The outlet bracket is designed to give a two-way outlet, a union cap being provided to blank the passage not required. The trunnion block is also drilled at the left bottom for an inlet nipple and a screwed spigot is fitted at the left top for the union cap when not in use.

A mounting base is secured to the underside of the trunnion block. It is dovetailed to fit the slide in the mountings; drilled on the underside for the mounting recoil pin to enter, and a tubular portion extends forward to house the ejection tube.

*Barrel casing.—Interior.*—Differs in that the No. 5 steam tube is larger in diameter than the No. 1 and is assembled from the rear, the trunnion block being screwed for the steam tube head and the socket riveted to the end cap.

*Right outside plate.*—Is an unlightened plate similar to that on the Mk. I gun. It has a slot cut near the top edge for the engagement of the rear cover catch and a bracket for the layshaft riveted immediately to the rear of the feed block gap. The bracket is drilled vertically for the layshaft and a small screwed hole is drilled horizontally for the layshaft retaining screw.

*Left outside plate.*—Has two hinge plates riveted near the top edge for attachment of the rear cover and a bracket, secured by screws, assembled into tapped holes in the side plate in substitution for the two fusee box studs. The bracket is machined in the centre to form a hook for the attachment of the fusee spring box. A hole is provided near the step in the cam for the assembly of a safety stop. This stop is introduced to restrict the forward movement of the lock when a "first position" stoppage occurs and so prevents the nose of the bullet of the upper cartridge on the extractor from making contact with the cap of the cartridge in the feed block. The stop comprises a Mk. II bracket, riveted over the hole in the outside plate, in which is housed a plunger with spiral spring and a detent which prevents the plunger turning. On the outer end of the bracket is screwed a cap which retains the housing details and is locked in position by ears on the detent.

*Bottom plate.*—No grooves are provided along its edges, the sliding shutter being omitted. A bracket riveted near the rear end is stepped on its front face for engagement of the trigger guard catch and drilled transversely for the engagement of an elevating pin when the gun is mounted in a No. 5 M.G. mounting.

*Mk. IV rear-crosspiece.*—All details for actuating the firing mechanism, the arms with grips and oil bottles, are omitted. The rear face has flanges for the assembly of a "shoulder-piece" or "pad, rear-crosspiece" and two holes between the flanges to permit inspection of the barrel and ejection tube.

*Mk. IV front cover.*—Has a "slam" catch (Mk. III) assembled to the front end, the body of the cover being designed to accommodate it. The catch engages a stepped plate riveted to the side plates to the rear of the trunnion block, the upper portion, of curved formation to facilitate operation, projecting above the cover. The catch spring is assembled to a stud on the underside of the cover. A projection is formed near the rear end which is drilled horizontally for the spindle of the tangent sight and a bracket riveted on the upper surface near the front acts as a support for the tangent sight when it is positioned horizontally.

*Mk. V rear cover.*—Is hinged to the left side of the breech casing. The Mk. II ramps are of reduced form to clear the lock when opening and closing the cover. A projection on the top is grooved to carry the Mk. III rear cover catch which slides transversely, a Mk. IV spring forcing it into engagement with the slot in the right outside plate and an upward projecting thumb-piece formed to facilitate disengagement. An extension on the right of the cover is drilled for the Mk. I\* trigger lever, the axis of which is in alignment with the axis of the Mk. II layshaft. The trigger lever has a downward projecting tongue which engages a slot in the top of the layshaft when the cover is closed. A nut and split keeper pin secures the lever to the cover and a trigger lever spring which presses the arm of the lever forward is housed in a seating secured to the underside of the cover. A stud is provided on top of the cover for attachment of the No. 3 cheek pad, the bridge for the tangent sight, together with the rear cover lock and trigger bar, being omitted.

*Mk. V tangent sight.*—Has a shorter stem with a spindle at the bottom which projects to the right at right angles and passed through the housing on the upper surface of the front cover.

Detents on the spindle face engage corresponding recesses in the bracket for positioning the stem horizontally and vertically. The detents are held in engagement by a spiral spring which, together with a locking nut with keep pin, is assembled to the opposite end of the spindle. A Mk. II plate, graduated from 100 to 1400 yards, in 100-yard intervals, is fitted to the stem and a Mk. II\*\* or Mk. III tangent sight slide is assembled to provide the means for sighting.

*Mk. II ejection tube.*—Is a detachable tube for the ejection, in a forward direction, of empty cases and unfired cartridges. It passes through the mounting base and has at the rear end a head which is drilled transversely for an axis pin by which it is hinged to the trigger guard. The head is slotted on the underside and a shaped wire spring is inserted and held by a pin. This spring has one part protruding into the bore of the tube and acts as a check to prevent cases or unfired cartridges falling back into the gun when at elevation.

*Mk. II trigger guard.*—Is designed to seat against the bottom plate of the gun and is retained by a sliding catch which engages the step on the front of the elevating bracket. The front end of the guard is slotted to receive the rear end of the ejection tube and a hole is provided for an axis bush and split pin which together retain the ejection tube to the guard. At the rear of the axis bush hole is a small plate set transversely,

the lower end of which has two small projections. This plate causes any water leaking from the rear packing of the barrel to drip clear of the gunner's hand.

A loading catch is fitted to the trigger guard, the details of which are as follows:—A spindle with a toe-piece on the right side is housed in a transverse hole in the guard. A torsional spring is fitted over the spindle, one end being anchored to it and the other to a sleeve secured by a screw on the left side of the guard. A small lever with a chain attached is secured by a screw to the left end of the spindle; the other end of the chain is attached to a stud on the side of the guard.

The lower part of the trigger guard is formed as a pistol grip, the side-pieces being secured by a screw and a screwed bush. A Mk. II finger trigger, designed to be operated by two fingers, is arranged with a bar extension which slides horizontally in the trigger guard, a Mk. II trigger catch being pivoted at the front of the bar which engages the arm of the Mk. II layshaft lever. This lever pivots in a hole drilled in an extension on the right of the trigger guard, its stem being slotted at the top for the engagement of the layshaft.

A Mk. II safety catch is fitted in the trigger guard frame, and is in the form of a spring operated plunger engaging a bent on the underside of the bar of the finger trigger. It is withdrawn from engagement by downward pressure on a thumb-piece which is connected to the plunger by a screw. The thumb-piece can be fitted to the right or left side of the trigger guard as may be required.

*Mk. III fusee spring box.*—Is of cast aluminium alloy. The front end is formed as a rectangular loop for attachment to the casing and a projection along its length carries an adjusting screw. The screw is retained at the front by a nut and has a vice pin at the rear to enable adjustment to be made from that end. A screwed sleeve on the adjusting screw has an arm to which the front end of the fusee spring is attached. A stud on the underneath side of the box is provided for the attachment of the Mk. III cheek pad.

*Mk. II fusee spring.*—Has a hook at the front end in lieu of the nut.

## 12. Description of recoiling portions

*Barrel.*—Differs from that in Mk. I guns only in that the muzzle end is enlarged for three inches of its length and the front face is coned to form a muzzle cup. This barrel may be converted from an existing Mk. II barrel by the addition of a sleeve (Mk. III). New barrels are manufactured with the enlargement integral with the barrel (Mk. IV). This design

of barrel allows stripping from the gun without removing the muzzle-attachment.

*Crank.*—Is of the drilled pattern (Mk. IA) mentioned in the description of Mk. I guns.

*Mk. II breech lock.*—Differs only in the extractor. The lower end of the Mk. II, No. 2 extractor is reduced in width to enter and travel in a longitudinal groove in the trigger guard and is fitted with a cartridge detent with a spring and retaining pin.

The object of the detent is to retain the empty case, or an unfired cartridge, on the extractor until it is inserted in the ejection tube.

*L.H. feed block.*—Is designed for feeding the belt into the gun from the left side. The body, which is of gunmetal, has the mouth for receiving the cartridge belt on the left side and an additional bearing at the front for the slide lever which operates the slide. The slide lever is operated by means of a cam lever directly connected to the bottom lever which is housed in the bearing on the right. This arrangement reverses the action of the slide from that in right hand feed blocks. The belt retaining pawls (designated bottom pawls in the right hand feed block) are pivoted above the mouth. They are inclined at an angle, the non-acting ends together with the connecting plate projecting above and to the left of the body, in such a position that they can be depressed to disengage them from the belt by the same motion required for the release of the top pawls. The retaining pawls rotate about two screwed pins and are held in engagement with the belt by means of a coil spring placed around the front axis. The top pawls are similar to those used in right hand feed blocks, the front pawl in one block being identical with the rear pawl in the other, and vice versa.

## 13. Detailed stripping of the gun

*Note.*—See "Points to be observed, Section 5".

1. With the gun resting on a suitable bench or table strip in the following order.—

*Note.*—Operations marked with an asterisk (\*) will only be performed by an armourer.

2. *Lock.*—Unload; open the rear cover, pull the crank handle on to the roller; see that the extractor drops, place the finger between the extractor and stop and lift the lock, at the same time allowing the crank handle to move slowly forward until the lock is released from the side-plates. Give the lock one-sixth of a turn on the connecting rod and lift out.

3. *Feed block*.—Raise the front cover and lift out.

4. *Fusee spring box*.—With the right hand at the rear and the left hand at the front press the box forward until clear of the stud and hook and remove. Disconnect the fusee chain and remove the box and spring.

5. *Fusee*.—Turn the fusee to the rear until the lugs on the stem are free and withdraw.

6. *Recoiling portions*.—Raise the rear cover, unscrew the "T" fixing pin, and lower the rear-crosspiece; remove the right and left slides and draw out the recoiling portions. Disconnect the side-plates from the barrel (removing the left one first).

7. *Trigger-guard and ejection tube*.—Grip the pistol grip with the left hand, press the trigger guard catch forward with the right thumb and lower the trigger guard. Withdraw the ejection tube from its seating.

8. *Muzzle-attachment*.—With the combination tool unscrew the casing, remove the front and rear cups, and unscrew the gland.

9.\* *Check lever*.—Drive out the keeper pin from the underside, and remove the check lever.

10.\* *Tangent sight*.—With a suitable punch drive out the keeper pin from the nut. Unscrew the nut, remove the tangent sight and spring.

11.\* *Front cover*.—Remove the keeper pin and check nut and push out the joint pin.

12.\* *Rear cover*.—Remove the split pins and withdraw the hinge pins.

13. *Safety stop*.—With the nose of a bullet press the detent safety stop inward until the ears are clear of the cap. Unscrew the cap and remove detent, spring and plunger.

14.\* *Rear-crosspiece*.—Remove the keeper pin and check nut and push out the joint pin.

15.\* *Layshaft*.—Remove the retaining screw and lift out the layshaft.

16.\* *Foresight*.—Remove the pin keeper foresight screw. Unscrew the keeper screw, remove the spring and foresight.

17. *Joint ring*.—Remove by hand. Tools of any description must not be used as damage to the ring may result.

18.\* *Steam tube*.—Place the gun so that it stands on the end cap. Remove the keeper screw and unscrew the tube.

(Note.—The steam tube should not be removed if the valve is free.)

## 14. To assemble the gun

1. Reverse the foregoing operations, with the exception that the recoiling portions must be replaced before the front packing and gland muzzle-attachment.

2. When assembling the barrel and side-plates, force must not be used. If the side-plates are not home on the barrel trunnions and crank bearings, the barrel must be withdrawn and the side-plates properly assembled, otherwise burrs on the crank bearings may result.

3. When replacing the gland of the muzzle-attachment care must be taken to see that it is screwed right home to the end cap.

4. Care must be taken when re-assembling the steam tube, that the acorn end is inserted into its seating in the barrel casing. The tube should screw home freely when in the correct position.

## 15. Stripping various component parts

1. *To strip the breech lock*.—See that the lock is cocked; force out the side lever split pin and axis bush, remove the side levers, extractor levers and extractor. Push out the tumbler axis pin and remove the tumbler. Release the lock spring and push out the trigger axis pin. Remove the trigger, lock spring, firing pin and sear with spring.

2.\* *To strip the extractor*.—Push out the gib spring cover and remove the spring and gib. Drive out the detent pin at the same time controlling the detent to prevent loss. The detent and spring can then be removed.

3.\* *To strip the R.H. feed block*.—Force out the split pin and separate the top and bottom levers; draw out the slide and remove the pawls and spring. Draw out the bottom pawl axis pin and remove the spring and pawls.

4.\* *To strip the L.H. feed block*.—Force out the split pin and separate the cam and bottom levers; remove the slide lever, take out the slide and remove the pawls and spring. Unscrew the retaining pawls axis pins and remove the retaining pawls and spring.

5.\* *Trigger guard*.—Force out the trigger guard axis bush split pin and axis bush and remove the ejection tube. Unscrew the layshaft lever retaining screw. Depress the trigger catch and rotate the layshaft lever forward until clear of the slot in the side of the trigger guard body; remove the lever. Push the finger trigger upward rotating it about the trigger spring pin and when clear of the body remove the

trigger from the spring. With a suitable punch drive out the trigger finger spring pin and remove the spring with its guide. Unscrew the safety catch screw and remove the thumb-piece, plunger and spring. Unscrew the loading catch lever screw and remove the lever from the spindle, force open the "S" hook and remove from the stud. Withdraw the loading catch spindle with spring, releasing the tension on the spring as the spindle is being withdrawn. Unscrew the sleeve screw and remove the sleeve. Press the trigger guard catch forward until the screws which secure the thumb-piece are opposite the two holes on the left of the trigger guard body. Unscrew the screws and remove the thumb-piece, catch and spring. Drive out the catch spring pin and remove the spring with its guide. Unscrew the pistol grip side-pieces screw and remove the side-pieces.

6.\* *To strip the finger trigger.*—Drive out the trigger catch axis pin, taking care that the trigger catch spring is not lost, remove the catch and spring.

7.\* *To strip the ejection tube.*—Drive out the check pin and remove the check.

8.\* *To strip the fusee spring box.*—Unhook the fusee spring from the sleeve, drive out the pin which secures the fusee spring adjusting screw nut and unscrew the nut. Unscrew the adjusting screw from the sleeve and remove both from the fusee spring box.

9.\* *To strip the rear cover.*—Remove the rear cover catch finger-piece screw on the underside of the cover, slide the thumb-piece together with the spring and finger-piece to the right, taking care that the spring does not fly out when it is clear of the cover. Remove the split pin retaining the trigger lever nut and unscrew the nut; remove the lever and spring, taking care that the spring is not distorted or lost.

10.\* *To strip the front cover.*—Remove the split pin retaining the catch axis pin, force out the pin and remove the catch. Remove the spring.

## 16. Assembling various component parts

Reverse the order of stripping, the following points being observed.

1. *Breech lock.*—The lock spring must be forced home with the long arm toward the extractor when all other components have been assembled and the lock is in the fired position.

*Note.*—The firing pin should never be released unless the extractor is up against the top stop.

2. *Trigger guard.*—When assembling the loading catch, care must be taken that the spring is tensioned the correct way so that the toe-piece on the right end of the spindle is normally held down. An initial tension of approximately a half-turn should be placed on the spring by means of the sleeve on the left.

3. *Ejection tube.*—Position the check and drive in the pin. After assembly test the check with a dummy cartridge to ensure satisfactory functioning.

4. *Rear cover.*—When assembling the catch, the finger-piece and catch should be placed together with the spring in position between them. Slide the assembly into position in the cover taking care that the spring does not fly out during the process.

GUNS, MACHINE, VICKERS, .303-IN., MKS. IVA AND IVB

## 17. Description of differences from Mk. VII gun

*General.*—Mark IVA and IVB guns are converted from Mk. I guns and with the exception of the steam tube and some minor manufacturing differences, are identical. They differ from the Mk. VII gun in the following respects.

*Barrel casing.*—The trunnion block and barrel casing are modified from those of the Mk. I gun, the majority of the barrel casings being of the corrugated type. The end cap is similar but with a smaller gland hole. The Mk. IV muzzle-attachment is similar to that on Mk. I guns except that the screwed portion of the Mk. II gland is slightly larger in diameter but not so large as that of the Mk. III gland of Mk. VII guns. The Mk. II gland and the Mk. II outer casing have four interruptions in lieu of three on the muzzle-attachment for Mk. I guns, and the outer casing has four external radial recesses at the rear end, any one of which can be engaged by the lower part of the Mk. II foresight, thereby securing the outer casing to the gun. All cones muzzle-attachment on these guns are of the Mk. II type.

The crosshead joint is removed from the trunnion block and a dovetailed base is riveted in position for mounting purposes. This base carries an ejection tube which, unlike the Mk. VII gun, is not removable. On the left side of the trunnion block is a cylindrical condenser boss and a drain hole, for water, which is plugged by a No. 2 screwed plug. No outlet bracket is fitted and the hole for filling the casing remains as for the Mk. I gun.

The screwed hole for the head of the steam tube in the rear face of the trunnion block is smaller in the Mk. IVA than in

the Mk. IVB gun and in both cases it is smaller than that in the Mk. VII gun. The Mk. IVA gun has no keeper screw to secure the head of the No. 2 steam tube, but the chiselled lines on the head and the trunnion block should correspond to ensure the correct relationship of the steam escape hole in the head with the steam escape tube in the trunnion block.

*Breech casing.*—The outside plates, bottom plate and covers are modified from those used on Mk. I guns.

The *bottom plate* has interrupted slots cut in the shutter groove for the assembly of the Mk. I trigger guard; the right elevating joint lug is removed and the left lug converted into a loop for attaching a No. 1 or No. 2 cheek pad. An elevating bracket, similar to that on Mk. VII guns but without the step for the trigger guard catch, is riveted near the rear end.

The *Mk. III front cover* is similar but the tangent sight bracket is riveted to the cover instead of being integral with it.

The *Mk. III rear cover* is similar to the Mk. I except that the hinge brackets, trigger lever bracket, and catch bracket are riveted to the cover instead of being integral with it. The Mk. I catch is of different design, being similar to that of the front cover but in two parts, the lever portion being arranged to disengage the catch portion when pressed to the left.

*Ejection tube.*—As mentioned under "barrel casing" this is riveted to the trunnion block. The Mk. I check consists of a flat, shaped plate, held in position by a leaf spring.

*Mk. I trigger guard.*—Has interrupted flanges along each side which engage the shutter plate grooves. It is held in the forward position by a Mk. I catch which engages one of the interruptions cut in the bottom plate grooves, and is released by pressure on the milled head on the right side of the guard. No loading catch is incorporated and the layshaft lever bracket is also omitted. A slot is cut at the right front for the Mk. I layshaft lever which is assembled to the lower end of the Mk. I layshaft. The trigger catch is arranged so that when the finger trigger is pulled, the catch rises and engages the layshaft lever, so transmitting the motion to the layshaft.

The *fusee spring box* and *fusee spring* are identical with those on Mk. I guns.

All *recoiling portions* are identical with those of the Mk. I gun with the exception of the breech lock and the left hand feed block.

*Breech lock.*—A number of guns were issued with No. 2, Mk. I, extractors which differ from the Mk. II pattern only in the detent assembly. The Mk. I detent has a hemispherical

head and is retained by a plunger and a dovetail plate fitted in a dovetail slot in the rear face of the extractor. The plate is retained by a projection on the plunger which engages a hole in the plate.

## 18. Detailed stripping of the special components

*Muzzle-attachment.*—This must be removed before the recoiling portions. Rotate the foresight to approximately 45 degrees so that the muzzle-attachment casing can be rotated and removed. With the combination tool remove the cup; remove the keeper screw and unscrew the gland.

*\*Layshaft.*—Drive out the layshaft lever pin from the left, taking care that the pin is in line with the hole in the layshaft bracket. With a suitable punch tap the layshaft upward to remove the layshaft lever. Remove the layshaft.

*\*No. 2 Mk. I extractors.*—With the plunger detent held out of engagement from the plate, tap the plate out of its dovetailed seating, taking particular care that the detent plunger and spring are not lost as the plate is removed. The plunger, spring and detent can now be removed.

*\*Trigger guard.*—Remove the trigger catch guide pin; the finger trigger can then be removed by lifting upward. Remove the split pin on the left side of the guard and remove the catch and spring from the right.

*\*Rear cover catch.*—Remove the split pins and drive out the catch axis pins; remove the lever and catch. With a No. 3 M.G. punch operating through the hole in the right ramp, force the tail of the spring from its anchorage and when free, tap to the rear until it is clear of its seating.

*Check ejection tube.*—Insert a screwdriver between the spring and the mounting base until the projection on the spring is clear of its seating. By working the screwdriver under the projection, the spring can be lifted and the screwdriver then withdrawn. Disengage the rear end of the spring from the check and when free it can be removed. The check is now free in its slot and can be removed.

*Note.*—A piece of wire inserted in the small holes will be found to assist in removing the check.

## 19. Assembly of special components

*Muzzle-attachments.*—When assembling the gland care must be taken that the keeper screw is unscrewed sufficiently to clear the gland. When the gland is screwed home one of the

interruptions on the periphery should be in the correct position for the entry of the keeper screw. If not, the gland must be unscrewed a partial turn until an interruption is in the correct position; assemble the screw. Assemble the cup and outer casing, taking care that the foresight is correctly positioned to permit the assembly of the latter.

*Layshafts.*—Insert the layshaft from the top, assemble the layshaft lever and drive in the I keeper pin.

*No. 2 Mk. I extractors.*—Assemble the detent, spring and plunger, depressing the plunger to assemble the plate. Ensure that the plate is tapped right home until the projection on the plunger engages in the hole.

*Trigger guard.*—Insert the spring in the bracket and assemble the trigger guard catch from the right, pressure being applied to the catch to enable the split pin to be assembled. Place the finger trigger spring in its seating and insert the trigger from the top. When in position assemble the trigger catch guide pin and secure with a small length of wire.

*Rear cover catch.*—Assemble the spring, ensuring that the anchoring stud enters the hole in the ramp, assemble the catch and axis pin. Close the cover and engage the catch when it will be found that the catch lever can be readily assembled.

*Check ejection tube.*—With the aid of a suitable piece of wire forced into one of the small holes, assemble the check. Assemble the spring, engaging the front end first and then springing the rear end on to the check ensuring that the projection on the centre of the spring is fully engaged in its seating.

GUNS, MACHINE, VICKERS, .5-IN., MKS. VI AND VI\*

## 20. Description of differences from Mk. VII gun

*General.*—Mks. VI and VI\* guns, like the Mks. IVA and IVB patterns, are converted from Mk. I guns. Both are very similar to the Mk. VII gun (new manufacture), the Mk. VI\* being interchangeable with it in vehicles fitted with a header tank cooling system. Mk. VI guns are interchangeable with Mks. IVA and IVB guns. A description of the differences of Mks. VI and VI\* guns from the Mk. VII pattern is given below.

*Barrel casing.*—Is modified from Mk. I guns and fitted with a new end cap identical with that on Mk. VI guns. In Mk. VI guns the trunnion block is drilled for filling and draining and the holes tapped for screwed plugs as in Mks. IVA and IVB guns, while the Mk. VI\* guns have a two-way outlet bracket

and an inlet bracket riveted to the trunnion in similar positions to those in Mk. VII guns. The No. 3 steam tube in Mk. VI guns is identical with that in Mks. IVA and IVB guns and the No. 4 steam tube in Mk. VI\* guns is similar to the No. 5 tube in Mk. VII guns except that the acorn is slightly off-set from the centre line of the tube.

*Outside plates.*—Are modified from Mk. I guns and closely resemble those on Mk. VII guns.

*Mk. III front cover.*—Is identical with that on Mks. IVA and IVB guns.

*Mk. II fusee spring box.*—Is similar to the Mk. III on Mk. VII guns but has more material on the inner face so that the box fits closely to the lightened left outside plate.

GUNS, MACHINE, VICKERS, .5-IN., MK. V

## 21. General description

The .5-in. Vickers guns are similar in action to the .303-in. guns and in general design the Mk. V gun is very similar to the Mk. VI .303-in. gun, but is generally larger due to the increased size of the cartridge.

*Barrel casing.*—The barrel casing is similar to the corrugated casing used on Mk. I .303-in. guns. It is fitted with a Mk. III end cap, similar in appearance to that on Mk. VII .303-in. guns, which is drilled on the front face for the steam tube head and keeper screw and provided on the outside diameter with a cannellure of dovetail cross-section for the rubber joint ring.

The front barrel bearing which is screwed and sweated in position is threaded internally for the gland.

An elongated recess is machined in the front face of the end cap immediately above the barrel hole for the assembly of a Mk. IV packing gland lock, whilst at the bottom of the recess a hole is tapped for a Mk. II keeper screw. The lock is a small plate with serrations at one end to fit corresponding serrations on the periphery of the gland. An elongated hole through the lock allows the keeper screw to be tightened with the lock either in or out of engagement with the gland. The Mk. II joint ring is of dovetail cross-section to fit the cannellure in the end cap. The Mk. III packing gland is screwed into the front barrel bearing and is provided with a flange, the edge of which is serrated for the engagement of the packing gland lock. Flats are provided on the front of the gland for the .5-in. combination tool.

*Note.*—No muzzle-attachment is fitted to the .5-in. guns, as sufficient recoil is obtained without assistance from the gases.

The No. 2 steam tube is assembled from the front and is generally larger than the .303-in. patterns of tube, the steam being allowed to escape from a hole in the centre of the steam tube head. In this hole a spring-loaded valve is fitted, designed to release before the steam pressure in the barrel casing reaches 10 lb. per sq. in. The valve consists of a stainless steel ball held to its seating by a small coil spring.

The trunnion block is of gunmetal and after assembly with the barrel casing is drilled for two No. 2 screwed plugs.

## 2. Description of non-recoiling portions

*Breech casing.*—The outside plates are of high tensile steel, the rear ends being increased in thickness to provide additional strength at the guide slots for the side-plates. Cams riveted on the inside of the plates are similar in shape to those on .303-in. guns but with the step omitted. The right outside plate has a bracket riveted on the outside for the assembly of a safety stop which is in the form of a plunger, with a chamfered face to allow the extractor to force it back, and with a longitudinal hole for the plunger spring. The plunger and spring are held in position by a cap which is secured to the bracket by a bayonet joint and retained by two split pins. A check lever bracket is riveted near the lower edge of the right plate and a layshaft bracket is secured immediately to the rear of the feed block opening.

On the left plate two brackets are riveted near the top edge to provide hinges for the rear cover, whilst near the front a stud for the fusee spring bracket is secured. Holes are drilled at the rear of each outside plate for the rear-crosspiece axis pin and the "T" fixing pin. The hole in the left plate for the fixing pin is larger in diameter than that in the right hand plate, the "T" fixing pin being stepped to suit the two diameters.

*Mk. V bottom plate.*—Has a trigger guard carrier retaining bracket riveted near its rear end, the front face of the bracket being stepped for the engagement of the carrier catch. The underside is recessed as a seating for the trigger guard carrier.

*Mk. V front cover.*—Is hinged on an axis pin which passes through holes in the outside plates, the pin being retained by a castellated nut and split pin. A bracket is riveted on the underside at the front for the Mk. IV front cover catch which is a sliding catch with a finger-piece projecting upward for operation. The catch is held forward by a Mk. IV front cover catch spring and is retained in the bracket by a pin passing through a hole in the cover and an elongated hole in the catch. At the centre of the cover on the underside two

strips are formed for the retention of an extractor stop spring which is designed to take the blow of the extractor as it rises.

*Mk. VI rear cover.*—Is hinged to the left outside plate, two projections on the left in the form of hinges corresponding with the brackets on the outside plate. Hinge pins are provided and retained by split pins. A cavity is formed in the centre of the cover for the Mk. IV rear cover catch which is spring operated and designed to engage in a slot in the right outside plate. The catch is retained by a small pin which passes through a hole in the cover and an elongated hole in the catch, the head of the pin being on the inside of the cover and retained by the trigger bar. Guides are formed on the inside of the front portion of the cover for the Mk. V trigger bar, which is provided with a lug on the right side, drilled from the rear for the trigger bar spring, upon which the trigger bar operates. The trigger bar, which operates directly on the trigger of the lock, has a groove on the underside to clear the trigger during recoil. A split pin, passing through holes at the front end of the guides, retains the trigger bar in position.

*Mk. V resistance-piece.*—Is designed to fit in the recoil gaps of the outside plates and is held in position by the rear-cross-piece. On the right side a stud is formed to carry the roller for the crank handle, the roller being retained by a collar and split pin. A dovetailed slot is provided on the left for assembly of the fusee guard.

*Mk. III rear-crosspiece.*—Is hinged at the bottom of the outside plates by a screwed joint pin and secured at the top by a "T" fixing pin. Vertical flanges are arranged at the back of the rear-crosspiece for the assembly of a shoulder-piece or crank handle guard. A hole is drilled through the rear-crosspiece for inspection of the barrel.

## 23. Description of recoiling portions

The action of the recoiling portions is similar to that of the .303-in. guns. The various components are described below.

*Mk. I\* barrel.*—Is similar in design to the .303-in. barrel but is generally larger, the bore being .5-in.; the rifling is concentric with a left hand twist and has seven grooves and lands. The barrel is not threaded externally at the muzzle end and the bullet leads are omitted from the breech face. On the upper and lower faces of the trunnion are crossed recesses for the operation of the feed lever whichever way the barrel may be assembled. The ends of the transverse portion of the recess engage the bottom lever of the feed block whilst the centre portion is made to clear the stud on the lever.

Earlier pattern barrels (Mk. I) were without the centre part of the recess, and could only be used with Mk. I and Mk. II feed blocks, the stud on the bottom lever being omitted on these patterns.

*Mk. II side plates.*—Are similar to .303-in. pattern plates but have no dust extensions to the rear and the left plate has no forward prolongation.

*Mk. II crank.*—Has a connecting rod spring riveted to the inside face of the left flange; the spring having a snib formed on its flexible end to engage a notch on the side of the connecting rod.

*Mk. III crank handle.*—Is pinned to the hexagonal arm of the crank and is designed to operate the lock during the recoil movement.

*Connecting rod.*—Is similar to the .303-in. pattern but with an extension beyond the bayonet joint.

*Mk. V breech lock.*—Is similar in design to the Mk. II .303-in. lock. The casing has an additional distance-piece between the two sides at the top near the rear end. The extractor has a detent for retaining the cartridge until it is in the ejection tube. The detent, which is spring operated, is retained by a plunger and dovetail plate, the latter fitting in a dovetailed recess in the rear face of the extractor.

*Mk. II\* R.H. feed block.*—The body consists of a gunmetal casting which assembles into gaps in the outside plates of the gun. The cartridges are fed through an opening on the right side which has a semi-circular flange at the top and a flange of circular formation at the bottom. Three steel inserts riveted in the body act as guides and stops for the bullet; a further insert acts as a guide and stop for the cartridge. A slide carrying the feed pawls operates in grooves across the body and a hole at the rear left corner of the body is provided for the bottom lever.

*Mk. II\* bottom lever.*—Has two studs, the one at the extremity operating in the slots of the recess in the top face of the barrel, whilst the other, which prevents the feed block being incorrectly assembled in the gun, enters into the centre part of the recess. The top lever, which operates the slide, is secured to the bottom lever by a hexagonal projection on the stem of the latter engaging a hexagonal hole in the former. The belt retaining pawls pass through the top of the body toward the right; they are connected by a plate and kept by a coil spring in constant engagement with the belt as it passes through the feed block. A bullet guide spring fitted at the front, and a cartridge guide spring riveted at the rear

on the inside of the feed block positions the cartridge for engagement by the extractor.

*Mk. II\* L.H. feed block.*—This block is identical with the Mk. II\* R.H. feed block with the exception that the flange at the lower edge of the cartridge feed opening of the body is semi-circular instead of circular.

*Mk. II fusee with chain.*—Differs from the .303-in. pattern only in that it is larger and the end link of the chain is forked; the connecting pin for the rod fusee spring being riveted between the forks.

*Spring, fusee.*—Is a compression type spring which operates in the fusee spring tube.

*Fusee spring tube.*—Encloses the fusee spring. A nut screwed in the front end and held by a split pin is tapped for the adjusting screw. The rear end of the tube is flanged internally to form a stop for the spring whilst the outside is knurled for approximately two inches to provide a grip for adjusting the tension on the spring.

*Mk. II fusee spring rod.*—Passes through the fusee spring and is flanged at its front end to retain the spring, the rear end being of hook formation to engage the fusee chain.

## 24. Firing mechanism

The firing is controlled from a pistol grip mechanism mounted centrally under the breech casing.

*Mk. II trigger guard carrier.*—Is secured to the underside of the breech casing by an axis pin which connects it to the ejection tube and a catch which engages in the bracket on the bottom plate. At the rear end of the carrier is a loading catch which is similar in operation and design to that on Mk. VII .303-in. Vickers guns. The trigger guard carrier catch is of the sliding type and is located above the loading catch. A thumb-piece projecting through an opening in the right side of the carrier is connected to the catch by two screws. The front end of the carrier is forked to receive the head of the ejection tube and is connected by means of a bush and split pin, which are identical with the Mk. II Bush, axis, side levers and the Mk. II Pin, split, bush, axis, side levers, respectively. A bracket riveted on the right side of the carrier is drilled vertically for the No. 4 layshaft lever the arm of which passes through a slot in the side of the carrier immediately below the bracket.

*Mk. III trigger guard.*—Is fitted into the recess at the bottom of the carrier and is secured by two screws which pass horizontally from right to left through the carrier and guard, the latter

being formed into a pistol grip, having side-pieces attached by means of a screw and screwed bush. A Mk. III finger trigger is provided with a bar extension which slides horizontally and carries a trigger catch to engage the arm of the layshaft lever. A safety catch identical with that on Mk. VII .303-in. guns is incorporated in the trigger guard.

**Mk. III layshaft.**—Is housed in a bracket riveted to the right outside plate, the lower end being tongued to engage the layshaft lever and the upper end shaped to accommodate the trip gear plunger and spring. The underside of the head is machined to form a bearing for the lever trip gear. The layshaft is retained by a screw which passes through the bracket from the outside and engages a slot cut in the side of the layshaft. The layshaft spring, which is of leaf type, is housed in the top of the layshaft bracket, and bears against the top of the layshaft.

**Note.**—A number of early Mk. V .5-in. guns were manufactured without this spring and in order to avoid damage care must be taken when closing the rear cover or positioning the trigger guard carrier, that the layshaft is in the correct position.

**Mk. III ejection tube.**—Is a detachable tube similar to that on Mk. VII .303-in. guns. The ejection tube check consists of a domed plunger operated by a spring and retained by a parallel pin.

## 25. Detailed stripping of the gun

**Note.**—See "Points to be observed, Section 5."

1. The gun is stripped in the following order with the gun on a suitable bench or table.

**Note.**—Operations marked with an asterisk (\*) will only be performed by an armourer.

2. **Lock.**—Unload; open the rear cover, pull the crank handle on to the roller; see that the extractor drops, place a finger between the extractor and stop and lift the lock, at the same time allowing the crank handle to move slowly forward until the lock is released from the side-plates. Give the lock one-sixth of a turn on the connecting rod and lift out.

3. **Feed block.**—Raise the front cover and lift out.

4. **Fusee spring tube and spring.**—Remove the rear-cross-piece "T" fixing pin. Pull the crank handle on to the roller and insert the smaller diameter arm of the "T" fixing pin in one of the holes to be found about 2 inches from the front of

the tube. Release the crank handle and remove the fusee tube and spring by disengaging the fusee spring rod from the fusee and disconnecting the fusee spring bracket from its stud.

5. **Fusee.**—Turn the fusee to the rear until the lugs on the stem are free to be withdrawn.

6. **Trigger guard, trigger guard carrier and ejection tube.**—Hold the pistol grip with the left hand, press the trigger guard carrier catch forward with the right thumb and lower the trigger guard and carrier. Withdraw the ejection tube from its housing.

7. **Recoiling portions.**—Raise the rear cover and lower the rear-crosspiece; remove the resistance-piece and withdraw the recoiling portions. Disconnect the side-plates from the barrel (removing the left one first).

8. **Packing gland.**—With the M.G. screwdriver loosen the packing gland lock screw, slide the lock upward until the serrations are clear of those on the gland and tighten the screw. With the .5-in. combination tool remove the gland from the gun.

9.\* **Check lever.**—Remove the check lever collar split pin, collar, and check lever.

10.\* **Front cover.**—Remove the keeper pin and check nut and push out the joint pin.

11.\* **Rear cover.**—Remove the split pins and withdraw the hinge pins.

12.\* **Rear-crosspiece.**—Remove the keeper pin and check nut and push out the joint pin.

13.\* **Safety stop.**—Remove the safety stop cap split pins, press the cap inward and turn through 90 degrees. Lift off the cap and remove the spring and plunger.

14. **Trip gear.**—Rotate the trip gear lever, lifting it over the stop stud until the lever can be taken out. Remove the cap screw and rotate the cap approximately 60 degrees in a clockwise direction until it can be lifted off. Slide the trip gear spring (if fitted) from its seating.

15.\* **Layshaft.**—Remove the layshaft screw, lift the layshaft vertically from the bracket and remove the trigger bar lever from the stem. Drive out the trip gear spring retaining pin, and remove the spring and plunger.

16. **Joint ring.**—Remove with the fingers. Tools of any description must not be used as damage to the ring may result.

17.\* *Steam tube.*—With the gun on the rear-crosspiece, remove the steam tube keeper screw. Unscrew the valve and remove; unscrew the steam tube and remove.

*Note.*—The steam tube should not be removed if the slide valve is free.

18.\* *Plate, cover, base, mounting.*—† Remove the two fixing screws. Slightly lift the front end of the plate and slide forward until the tongue at the rear end is clear of the groove in the mounting base.

## 26. To assemble the gun

1. Reverse the foregoing operations with the exception that the recoiling portions must be replaced before the front packing and packing gland.

2. When assembling the barrel and side-plates, force must not be used. If the side-plates are not home on the barrel trunnions and crank bearings the barrel must be withdrawn and the side-plates properly assembled otherwise burrs on the crank bearings may result.

3. When replacing the packing gland care must be taken to see that it is screwed right home to the end cap.

4. Care must be taken when re-assembling the steam tube that the acorn is inserted into its seating in the barrel casing. The tube should screw home freely when in the correct position.

## 27. Stripping various component parts

1. *To strip the breech lock.*—See that the lock is cocked, force out the side lever split pin, and axis bush; remove the side levers, extractor levers, and extractor. Push out the tumbler axis pin and remove the tumbler. Release the lock spring, push out the trigger axis pin. Remove the trigger, lock spring, firing pin and sear with spring.

2.\* *To strip the extractor.*—Push out the gib spring cover and remove the spring and gib. Depress the detent plunger until it is clear of the plate and tap out the plate, taking care that the plunger and spring are not lost when the pressure on the spring is released. The plunger, spring and detent can then be removed.

3.\* *To strip the R.H. feed block.*—Force out the split pin and separate the top and bottom levers; draw out the slide, drive out the top pawl axis pin and remove pawl and spring.

† It should be noted that the screws are prevented from turning by metal punched into the slots.

Unscrew the retaining pawls axis pins and remove the retaining pawls and spring. Insert a No. 3 M.G. punch in the looped end of the bullet guide spring and remove from its seating.

4.\* *To strip the L.H. feed block.*—As for the R.H. feed block (above).

5. *To strip the trigger guard carrier.*—Force out the ejection tube bush split pin and axis bush and remove the ejection tube. Remove the two trigger guard fixing screws and remove the trigger guard. Unscrew the No. 4 layshaft lever retaining screw, rotate the lever until its arm is free of the slot in the carrier, and remove the lever. Unscrew the loading catch lever screw and remove the lever from the spindle, forcing open the "S" hook to remove from the carrier. Withdraw the loading catch spindle with spring, releasing the tension on the spring as the spindle is withdrawn. Unscrew the loading catch sleeve screw and remove the sleeve.

Press the trigger guard carrier catch forward until the catch screws which secure the thumb-piece are opposite the two holes in the body of the carrier, unscrew the screws and remove the thumb-piece, catch and spring.

6.\* *To strip the trigger guard.*—After removal from the carrier, push the finger trigger upward, rotating it about the trigger finger spring pin and after about 30 degrees rotation the rod finger trigger spring will be freed from the trigger; remove the trigger. With a No. 3 M.G. punch drive out the pin and remove the rod finger trigger spring. Unscrew the safety catch screw and remove the thumb-piece, plunger and spring. Unscrew the pistol grip side-pieces screw and remove the side-pieces.

7. *To strip the ejection tube.*—Drive out the ejection tube plunger pin and remove the spring and plunger.

8.\* *To strip the fusee spring tube.*—Remove the adjusting screw and the split pin retaining the tube nut; unscrew the nut and remove. With a suitable piece of wood or empty cartridge case inserted in the open end of the tube further compress the spring in order to remove the "T" fixing pin. Gradually release the pressure on the spring and remove the spring and rod.

9.\* *To strip the rear cover.*—Remove the trigger bar split pin, slide the trigger bar forward as far as possible and lift out; remove the trigger bar spring. Hold the cover catch back and push out the catch retaining pin; remove the catch and spring.

10.\* *To strip the front cover.*—Remove the split pin retaining the front cover catch pin, tap out the pin and remove the catch

and spring. With a suitable brass punch drive out the spring extractor stop.

*Note.*—This stop should only be removed when replacement is necessary.

## 28. Assembling various component parts

Reverse the order of stripping, the following points being observed.

1. *Breech lock.*—The lock spring must be forced home, with the long arm towards the extractor, when all other components are assembled and the lock is in the fired position.

*Note.*—The firing pin should never be released unless the extractor is up against the top stop.

2. *Ejection tube.*—Care must be taken that the pin, when driven in, is under the plunger spring and not through the coils.

3. *Carrier trigger guard.*—In assembling the loading catch care must be taken that the spring is tensioned the correct way so that the toe-piece on the right end of the spindle is normally held down. An initial tension of approximately a half-turn should be placed on the spring by means of the sleeve on the left.

GUNS, MACHINE, VICKERS, .5-IN., Mk. I

## 29. Description

The Mk. I pattern gun, of which only a few were manufactured, were used chiefly for experimental purposes, a number being mounted in Carden-Loyd M.G. carriers. In general construction it is similar to the Mk. I .303-in. gun, being fired by a firing lever mounted on the rear-crosspiece. Mounting points are similar and a flash eliminator is substituted for the muzzle-attachment.

GUNS, MACHINE, VICKERS, .5-IN., Mk. II

## 30. Description

The Mk. II pattern was designed for use in No. 6 M.G. mountings in Lanchester armoured cars. This pattern differs from the Mk. V mainly in that the dovetail base is wider, thereby preventing interchange with .303-in. guns.

Brief descriptions of the differences between the Mk. II and Mk. V patterns are given below.

*Barrel casing.*—Is fitted with a Mk. II end cap which is made of gunmetal in lieu of steel. The screwed hole for the

steam tube is slightly smaller in diameter and no cannellure is provided on the periphery for a rubber joint ring. A steam escape tube is arranged inside the end cap to take steam from the steam tube to the outer surface of the end cap where it is exhausted to the air. The Mk. I packing gland has around its periphery, in front of the serrated ring, a cannellure for the Mk. I joint ring. The No. 1 steam tube is identical with the steam tube in Mk. I .303-in. guns.

*Breech casing.*—The outside plates are similar to those on Mk. V pattern guns, with the exception that they are of uniform thickness throughout and the layshaft bracket on the right plate is extended downward to protect the layshaft lever.

*Mk. II bottom plate.*—Has interrupted grooves for the assembly of the trigger guard carrier and is not provided at the rear end with a bracket for the carrier catch, the retention of the carrier being obtained by a catch engaging in a slot in the grooves.

*Mk. II front cover.*—Is lighter and the catch is of the lever type, being operated by a leaf spring anchored by a stud in the centre on the underside of the cover. A spring extractor stop is not provided, the cover being shaped to form an extractor stop as on .303-inch pattern covers.

*Mk. III rear cover.*—Has a lever catch held in engagement by a plunger and spring. On the top of the cover at the rear left corner a bracket is riveted to carry a delay pawl, which is arranged to project downward and so delay the action of the crank, consequently reducing the speed of the gun. An adjusting screw on the top of the bracket is arranged to hold the pawl out of engagement when not required; also riveted to the cover are brackets for a tangent sight if and when necessary.

*Mk. II resistance-piece.*—Has narrower grooves for the engagement of the lighter outside plates and the stud for the roller is smaller in diameter. The roller is also smaller in diameter externally.

*Mk. II rear-crosspiece.*—Is similar to the Mk. III except that the grooves for the side-plates are narrower.

*Mk. II breech lock.*—A number of Mk. II guns of early manufacture are provided with a Mk. II lock which has been superseded by the Mk. V pattern, a description of which will be found under Mk. V guns (page 38); Mk. II locks differ from the Mk. V in the following respects.

*Mk. I side levers.*—The diameter of the recesses for the flange of the axis bush and the head of the split pin is smaller to suit the Mk. I pattern bush and split pin.

*Bush, axis, side levers, Mk. I.*—The flange is smaller in diameter.

*Pin, split, bush, axis, side levers, Mk. I.*—The diameter of the head is smaller to correspond with the axis bush.

*Mk. II extractor.*—Has a smaller hole for the detent, the Mk. I detent and Mk. I detent plunger being smaller in diameter. The gib slot is square at the top and bottom, the Mk. I gib being shaped accordingly.

*Mk. I L.H. and Mk. I R.H. feed blocks.*—A number of Mk. II guns will be found with Mk. I pattern feed blocks and differ from the Mk. II\* pattern in the following respects.

*Body, feed block, L.H., Mk. I and Body, feed block, R.H., Mk. I.*—The mouth at the top and bottom is in each case similar in shape to the .303-inch pattern feed block.

*Levers, bottom, feed block, Mk. I.*—Has a shallower recess in the bottom of the stem for the barbed end of the split pin. The stud in the centre of the arm is omitted.

*Pin, split, levers, feed block, Mk. I.*—Is longer and has a head of larger diameter.

*Pawls, top, L.H. and R.H. feed blocks, Mk. I.*—The thumb-piece is horizontal and wider.

*Springs, retaining, cartridge, L.H. and R.H. feed blocks, Mk. I.*—Are shorter at the riveted end.

*Mk. I fusee with chain.*—The end link of the chain is shorter and is solid instead of forked, the pin for the attachment of the fusee spring rod extending on each side of the link.

*Mk. I fusee spring rod.*—The hook at the rear end is forked to accommodate the solid link.

*Mk. I trigger guard carrier.*—Slides in the grooves in the bottom plate, being retained in position by a press catch, and having a side arm at an angle of 30 degrees so arranged to carry the trigger guard in an offset position to the left of the gun. The side arm is grooved on the underside for the trigger guard and is provided with a hole at the rear end for the trigger guard locking plunger. On the right of the carrier is arranged a small bracket to which the No. 1 layshaft lever is secured, the long arm engaging the trigger finger catch and the short arm making contact with the No. 2 layshaft lever.

*Mk. I trigger guard.*—Is designed to slide in the groove provided in the trigger guard carrier, a plunger at the rear end engaging in the hole in the carrier. The finger trigger extends the length of the trigger guard, provision being made at the front end for the trigger finger catch to engage the No. 1 layshaft lever.

*Mk. I layshaft.*—The lower extremity carries the No. 2 layshaft lever which is provided with a coil spring operating against the breech casing, the action of the spring obviating the necessity of the layshaft spring incorporated in the later pattern guns.

*Mk. I ejection tube.*—Unlike the Mk. III tube this is not detachable, being riveted in position. Two patterns of *check ejection tube* may be found, a plunger type as on Mk. V guns or a flat type similar to the ejection check on Mk. IVA and IVB .303-in. guns.

*Buffer.*—Is incorporated in Mk. II guns to assist in absorbing the force of recoil and consists of a bracket, which fits the rear end of the lock guides on the side-plates, and a spring and plunger which bear against the rear-crosspiece.

### 31. Detailed stripping of the special components

*Note.*—See "Points to be observed—Section 5."

1. *Trigger guard carrier with trigger guard.*—With the right thumb press the carrier catch and withdraw the carrier until the flanges correspond with the interruptions in the bottom plate. Remove the carrier.

2.\* *Carrier.*—Depress the trigger guard locking plunger and withdraw the guard approximately a quarter of an inch; insert a suitable punch under the finger trigger catch, depress and disengage the No. 1 layshaft lever; withdraw the trigger guard from the carrier. To strip the *carrier catch* drive out the retaining pin and remove the catch and spring. Remove the No. 1 layshaft lever screw and lever.

3.\* *To strip the trigger guard.*—Rotate the finger trigger upward about the axis pin of the finger trigger spring rod until the finger trigger can be disconnected from the rod and spring, then lift out. Drive out the axis pin and remove the rod and spring. Drive out the retaining pin and remove the trigger guard locking plunger and spring.

4.\* *To strip the check ejection tube.*—If of the plunger type, drive out the plunger pin and remove the plunger and spring. If of the flat type, with the aid of a screwdriver lift out the rear projection of the spring from its seating, disengage from the check and remove. Insert a piece of wire in one of the holes in the check and remove by sliding the check from its seating.

5.\* *To strip the rear cover.*—Drive out the catch axis pin and remove the catch, plunger and spring. *To strip the delay*

*pawl* unscrew the adjusting screw, remove the nut from the delay pawl axis screw and remove the screw, delay pawl and spring.

6.\* *To strip the front cover.*—Drive out the catch axis pin and remove the catch and spring.

### 32. Assembling the special components

Reverse the order of stripping.

GUNS, MACHINE, VICKERS, .5-IN., Mk. IV

### 33. Description

The Mk. IV pattern gun, of which very few have been manufactured, was the first .5-in. gun designed to be interchangeable with .303-in. pattern guns.

The design is similar to the Mk. V .5-in. gun with the exception of the stronger outside plates, rear cover, rear-crosspiece, etc., and the trigger guard which assembles direct to the bottom plate and not by means of a trigger guard carrier.

## CHAPTER III

### ACTION OF MECHANISM

GUN, MACHINE, VICKERS, .303-IN., Mk. I

The gun during firing follows a definite cycle of operations, and assuming the gun to be fully loaded, *i.e.* the first round in the chamber and the second engaged by the extractor in the feed block, the following action will take place when the trigger is pressed.

### 34. Firing action (first shot)

The safety catch being raised and the thumb-piece on the firing lever pressed, the pawl near the bottom of the firing lever pushes forward the bottom of the trigger bar lever which, being pivoted in the centre, causes the top to come to the rear, engaging a projection on the trigger bar and drawing it to the rear. As the trigger bar is withdrawn the front end of the slot engages the tail of the trigger, thereby releasing the nose of the trigger from the bent of the tumbler. The long arm of the lock spring then propels the firing pin on to the cap of the cartridge and fires the charge.

### 35. Action on recoil

The explosion will cause the recoiling portions to move backward through a distance of about 1 inch, thereby extending the fusee spring.

This backward movement is due partly to recoil, and partly to the effect of the muzzle-attachment, which acts as follows: the powder gases which escape through the muzzle after the exit of the bullet strike violently against the front cone, and rebound on to the front face of the muzzle cup, thereby assisting to drive the recoiling portions backward. The gases then escape through the vents in the outer casing.

### 36. First action in the feed block

As the recoiling portions travel backward, the recess in the prolongation of the left side-plate carries with it the stud on the bottom lever of the feed block. The bottom lever, being engaged to the top lever, causes the slide and the top pawls

to move to the right, enabling the top pawls to engage behind the cartridge, already held in position by the bottom pawls.

### 37. Backward rotation of the crank

The backward movement of the recoiling portions cause the tail of the crank handle to roll on the roller, thereby rotating the crank. The rotation of the crank draws back the lock, and causes the fusee to wind the fusee chain, thus further extending the fusee spring.

Owing to the momentum of the lock, connecting rod, crank and crank handle, the crank handle continues to roll against the roller. This rolling of the crank handle, assisted by the fusee spring, forces the whole of the recoiling portions forward again, with the exception of the lock, which continues its backward movement for a short distance before it joins in the forward movement.

### 38. Second action in the feed block

As the recoiling portions go forward, the recess in the prolongation of the left side-plate carries with it the stud on the bottom lever of the feed block. This bottom lever, acting on the top lever, moves the slide and the top pawls to the left, the pawls thus bringing the cartridge in the belt to a position against the cartridge and bullet steps, ready to be gripped by the extractor. The belt, as it moves to the left, slides between the bottom pawls, which are depressed as the cartridge passes over them, rising behind the fourth cartridge, holding the belt in position and preventing it from sliding back after the third cartridge has been withdrawn by the extractor.

### 39. Backward movement of the lock

As the lock moves backward, the extractor withdraws the live round from the feed block, and the empty case from the chamber. The horns of the extractor move along the surface of the cams until the cartridge is clear of the belt. When the extractor arrives at the end of the cams it is forced down by the ramps on the cover, thus bringing the cartridge drawn from the feed block into line with the chamber, and probably causing the empty case drawn from the chamber to fall off. The live cartridge is prevented from slipping down the face of the extractor by the bottom projection of the gib. (If the empty case does not fall off, when the extractor drops, it will be forced off as described in the forward rotation of the crank.)

### 40. Cocking action of the lock

The rotation of the crank gives an upward motion to the connecting rod and side lever head, the latter, bearing on the tail of the tumbler, rotates the tumbler on its axis, and forces the firing pin to the rear. The long arm of the lock spring acts on the projection of the firing pin, whilst the short arm bears against the nose of the trigger; consequently the withdrawal of the firing pin compresses the lock spring. As the tumbler further rotates, the short arm of the lock spring forces the nose of the trigger over the bent of the tumbler and carries the firing pin still further to the rear, thereby allowing the sear to rise, due to the action of the sear spring, and its bent to engage the bent on the firing pin. The firing pin is thus prevented from flying forward.

### 41. Action of the fusee spring

When the force of the explosion is expended, the fusee spring takes command, and unwinding the fusee chain from the fusee gives a rotary movement to the crank. This imparts a forward and downward action to the connecting rod and side lever head, thereby causing the lock to continue its forward movement.

### 42. Forward movement of the lock

As the lock travels forward, the extractor places the live round in the chamber, and is moved upward by the side levers acting on the extractor levers. The bottom projection of the gib slides over the base of the live cartridge in the chamber and the top projection of the gib slides over the base of the cartridge which has been moved into position in the feed block. The firing pin hole is thus brought opposite the cap. As the extractor rises, the empty case, if it has not already fallen off, will be forced off by the seating for ejection.

As soon as the extractor reaches its highest position, the side-plate springs engage in grooves in its sides. (This prevents the horns from falling and fouling the front end of the solid cams in the breech casing at the beginning of the backward movement when there are no cartridges on the face of the extractor.) The further movement of the connecting rod and side lever head causes the lock to be forced slightly farther forward, and the breech is then closed. During this movement, the steps on the side levers travel over the bents on the extractor levers.

### 43. Firing action (subsequent shots)

The firer, by maintaining pressure on the thumb-piece, holds back the trigger bar; therefore, each time the lock goes

forward, the front end of the slot holds back the tail of the trigger before the lock is quite home. By this means the nose of the trigger is prevented from engaging in the bent of the tumbler. When the lock is home, the side lever head depresses the sear, thus allowing the long arm of the lock spring to carry the firing pin on to the cap, and fire the charge.

The depression of the sear is so timed that the firing pin cannot be released until the lock is in the firing position.

#### 44. Action inside lock when pressure on thumb-piece is released

On releasing pressure on the thumb-piece the trigger bar is allowed to resume its normal position. The short arm of the lock spring forces the nose of the trigger over the bent of the tumbler, so that, when the sear is depressed, the nose of the trigger engages in the bent of the tumbler, and the firing pin is unable to go forward.

#### GUNS, MACHINE, VICKERS, .303-IN., MKS. IVA, IVB, VI, VI\* AND VII

The cycle of operations for these guns is similar to that of the Mk. I .303-in. gun. The main differences being in the firing mechanism which is operated as follows.

#### 45. Firing action (first shot)

When the safety catch is depressed and the finger trigger pulled to the rear, the trigger catch causes the layshaft lever to rotate, which in turn rotates the layshaft. The recess in the head of the layshaft, being in engagement with the lug on the trigger lever, the latter moves with the layshaft. The trigger lever, making contact with the tail of the lock trigger, draws it to the rear in the same manner as the trigger bar of the Mk. I .303-in. gun. (See under breech casing, page 15.)

The action of the various recoiling portions is similar to that of Mk. I .303-in. guns, with the exception that the empty cartridge case during the backward movement of the lock, being prevented from falling from the extractor by the detent, is inserted into the ejection tube by the extractor during the forward movement of the lock. Empty cases that may already be in the tube are forced forward, and when the extractor rises, the detent rides over the base of the cartridge case which is then retained in the tube by the ejection check.

In guns fitted with left hand feed blocks the movement of the feed slide is the reverse of the right hand feed blocks, due to the action of the cam lever.

#### GUNS, MACHINE, VICKERS, .5-IN., MK. V (ALSO MKS. II AND IV)

#### 46. Firing action

The action of these guns, when the trip lever is in the "Automatic" position, is the same as that of the .303-in. tank pattern guns.

When in the "Repeat" position rotation of the layshaft brings the arm of the plunger trip gear into contact with the stem of the trip gear lever, so forcing the plunger into the head of the layshaft to disengage from the trigger lever immediately after the lock trigger has been released.

On the forward movement of the lock, the trigger lever, which is now free of control by the trip gear plunger, is pushed forward by the lock trigger into re-engagement with the plunger.

## CHAPTER IV

### CARE AND CLEANING

#### 47. General remarks

The care and cleaning of the gun is of the greatest importance in order that the gun may fulfil to the utmost of its power any task demanded of it from a mechanical point of view and also in order that machine gun officers may have confidence that the maximum results will be obtained from their guns when firing.

#### 48. Responsibility, cleaning, etc.

Officers commanding units are responsible for the condition of the guns in their charge and for instruction of their men in the methods of cleaning so that no unnecessary wear may result.

The greatest care should be exercised in the daily handling of the gun in order to avoid damage to the various parts, particularly the sights, muzzle, etc.

1. *Materials supplied.*—Scales of materials for cleaning and oiling machine guns and their mountings will be found in "Equipment Regulations, Part 1".

2. *Daily cleaning.*—The outside of the gun will be cleaned and all parts of the mechanism wiped with an oily rag; the bore of the gun will always be left oily.

To clean the mechanism mineral burning oil should be used. If any parts are clogged with dried oil, spirits of turpentine should be used to remove it. After each part is cleaned, it should be thoroughly dried and slightly oiled with Oil "A". Very little oil should be used for this purpose, as it is apt to catch the dust and clog.

Moving the recoiling portions by working the crank handle, after "hanging" the lock or with the loading catch in engagement, affords a ready means of oiling the recoiling portions and the bearing parts of the barrel, viz:

- (a) just in front of the barrel block (to which access can be obtained by removing the feed block), and
- (b) at the muzzle end, in front of the packing gland.

The lock is hung as follows: pull the crank handle slowly

backward until the horns of the extractor drop into the steps on the rear face of the solid cams, or the detent safety stop has sprung inward in front of the extractor horn. The barrel and side-plates can now be moved backward by rotating the crank handle, placing the thumb behind the knob of the crank handle and the two first fingers on the tail.

Care must be taken, when oiling, to prevent the oil coming into contact with the rubber joint rings on A.F.V. pattern guns.

No oil other than "A" should be allowed to remain in the bore. The function of this oil is to cover the bore with a waterproof film, and thus prevent moisture from attacking the steel and forming rust. It must be well worked into the flannelette with the fingers, otherwise it will be scraped off by the breech end of the barrel. When paraffin has been used all traces of it should be thoroughly removed and the part coated with Oil "A", for paraffin, although an efficient agent for removing rust, does not prevent its formation.

3. *Weekly cleaning.*—The gun should be thoroughly overhauled and cleaned.

The old oil should be removed from the bore of barrels which must be re-oiled after cleaning. In cases where the bore has once become rusty it should be wiped out with flannelette and then cleaned with the gauze on the pullthrough.

4. *When in store.*—When returned to store, packed for transmission other than by sea or stored in any place where they cannot readily be examined, the unpainted surfaces of steel of machine guns, their spare parts and tools will be covered with a thin coating of a mixture consisting of equal parts, by weight, of red mineral jelly and oil "A". Thick coatings must not be applied owing to the difficulty of removal. In cold weather the mixture will be warmed until it becomes liquid. The bores of the barrels will be coated with the mixture, heated until it becomes thin, and applied by means of a strip of flannelette placed in the end of the rod of twisted copper wire and drawn through from both ends. The chamber will be coated with the mixture in an unheated condition.

In order to prevent the formation of rust on the exterior of the barrel, due to condensation of moisture, the barrel casing will be completely emptied, and the screwed and cork plugs will be removed to permit of free circulation of air within the casing. If the gun is likely to be so left for any length of time, the asbestos packing will be removed from the packing gland and from the cannellure of the barrel and, if still serviceable, will be dried off and re-oiled for future use.

5. *Care of barrel.*—The life of a barrel depends upon the amount of wear that it receives in the bore. This wear can be attributed to three causes :—

- i. The friction of the bullet.
- ii. The heat generated when ammunition is fired.
- iii. The friction of the pullthrough gauze when the bore is being cleaned.

Undue wear is caused by improper and unnecessary use of the pullthrough gauze, to prevent which it is most important that the instructions for cleaning be observed. It is recognized that it may be necessary to modify these instructions to suit local climatic conditions, or to suit individual barrels which are in a bad state of preservation.

6. *High polish of the bore a safeguard against rust.*—When a barrel is new, the bore carries a high polish, and this is a great safeguard against rust and metallic fouling, but it must be recognized that as the bore becomes worn this polish will diminish. Efforts to restore it with wire gauze on the pullthrough result in unnecessary wear. At the same time it must be clearly understood that, in a machine gun that is well cared for, whilst the brilliancy of the polish will diminish, the lands of the bore should still be bright and free from all stain of rust and fouling.

7. *Various kinds of fouling.*—In order that the instructions for cleaning may be understood, it is essential that the causes of fouling in barrels should also be understood. Fouling may be said to be of three kinds :—

- i. Internal, caused by the forcing of the products of combustion into the pores of the metal.
- ii. Superficial, caused by the deposit in the bore of the solid products of combustion of the charge and cap composition.
- iii. Metallic fouling, caused by a portion of the cupronickel of the envelope of the bullet being left on the surface of the bore, and appearing as a whitish streak on the lands, or as a roughness on the edge of the grooves.

The result of neglect in either of the first two cases is the same, viz., the formation of rust in the bore, calling for the excessive use of wire gauze, or even more drastic treatment, thereby causing unnecessary wear.

Internal fouling can be removed satisfactorily by the use of boiling water. If for any reason this method of cleaning cannot be used, the barrel will "sweat" and a hard black crust of fouling will appear in the bore. This will turn to red

rust if not removed, and the barrel will then require repeated cleaning with flannelette and with gauze, for a time, which will vary according to climatic conditions and the state of the bore.

Superficial fouling is readily removed when warm, by the use of a cleaning rod and flannelette, but if it is allowed to remain long in the barrel it will become hard, and will have a corrosive effect equal to that produced by internal fouling.

The barrel should be carefully watched for the appearance of nickelling or metallic fouling. This, if deposited near the muzzle or the breech, is visible to the eye when the bore is clean, but in the centre of the bore can only be detected by the use of the gauge plug. It is a cause of inaccuracy, and if a gun, for no apparent reason, shoots badly, its presence should be looked for as a possible explanation. The double pullthrough and gauze will be used to remove metallic fouling.

#### 49. To clean the barrel

1. Pull the crank handle on to the roller, open the cover, raise the lock and let it go forward slowly and rest upon the top of the breech casing. In the case of .303-in. guns, first remove the outer casing and muzzle cup of the muzzle-attachment. Place a piece of flannelette in the eye or slot of the cleaning rod, care being taken that the latter is surrounded with flannelette, which should be well oiled; then insert the rod into the muzzle of the barrel, placing the movable bush on the muzzle, and pass it up and down till the barrel is clean; replace the oiled flannelette by dry pieces; inspect the bore by means of the mirror reflector, and finally pass freshly oiled pieces through the bore, leaving the barrel slightly oiled. If the passage of the flannelette through the breech is stiff, and force is required, it is necessary that the flannelette be reversed on the rod before being withdrawn.

2. When the gun has been fired, daily cleaning of the barrel is necessary for at least ten days afterwards. Subsequent cleaning must depend on the discretion of the officer in charge of the gun; in a dry climate once a week should be sufficient; but in situations where the barrel is exposed to a moist atmosphere it may be necessary daily. The bore should at all times be left coated with oil.

3. For use on the double pullthrough wire gauze in pieces is supplied, and should be used for the removal of hard fouling or of rust. In attaching it to the pullthrough the following method should be adopted.

Turn the shorter sides of the gauze toward the centre so that the longer sides take the form "S". Open the loop of the pullthrough and put one side of it in each loop of the "S".

Then coil each half of the gauze tightly around the portion of the cord over which it is placed, till the two rolls, thus formed, meet.

The object of the gauze is mainly to scour out the grooves and it should therefore fit the bore tightly. When it fails to do this it should be partially unrolled and packed with paper or flannelette to increase its bulk.

Grit must be removed from the gauze and pullthrough before use; the gauze should be thoroughly oiled.

4. Cleaning with gauze entails wear of the bore and should not be pulled through the barrel more often than is necessary. The surest way of preventing the necessity for the continued use of the gauze is to keep the bore oiled so as to prevent rust. A barrel which has become rusty will always be more liable to rust than one which has been kept in good condition. It will therefore require more attention and more frequent cleaning with gauze. Similarly, a barrel which is showing signs of wear will require more care than one in which the surface has not been attacked, for, the eroded portion being rough, moisture is more likely to collect on it and form rust. It is also more difficult to remove rust thoroughly from a rough surface than from a smooth one.

5. *To use the double pullthrough.*—Remove the barrel, place the muzzle protector in position and, having thoroughly oiled the gauze, drop the weight through the bore from the breech end. Fix the barrel in a vice, or have it held firmly by two men, and with the assistance of another man pull the cord backward and forward until the fouling or rust is loosened; when the gauze is worn out it should be replaced by one of the spare pieces which are issued with each double pullthrough.

When signs of wear appear a new cord should be taken into use to avoid the risk of the pullthrough breaking in the bore. If a breakage does occur, the barrel must at once be taken to the armourer. No attempt should be made by the gunner to remove the obstruction.

Great care must be taken to avoid cord wear at the breech end of the barrel. The barrel can now be cleaned with the cleaning rod and flannelette as described above.

6. *Cleaning after firing.*—Guns will be cleaned immediately after firing. The fouling can easily be removed while it is still warm and before it has had time to set hard. The less time allowed for the fouling to exercise its power of absorbing moisture from the air, the less chance is there of rust forming.

7. *Cleaning with boiling water.*—An effective means of cleaning the bore, whether firing has taken place or not, is found in

the use of boiling water. Before boiling water is used the barrel should be taken out of the gun and superficial fouling and grease removed. About five or six pints should be poured through the bore from the breech, using a funnel for the purpose. The bore should then be thoroughly dried and oiled. Not only does the boiling water remove the fouling, but the expansion of the metal due to the heat of the water loosens any rust there may be and makes it easily removable.

8. *In sandy countries.*—Great care is necessary in the quantity of oil to be used. A thin film of oil, *i.e.* parts wiped over with a slightly oiled rag, will prevent rust during the night and also be sufficient lubricant for working the gun during firing.

#### 49a. Anti-Frost Measures

*In frosty weather.*—Oil the mechanism very slightly.

Keep the friction of the recoiling portions as low as possible and adjust the weight of the fusee spring to not more than 7 lb. in the case of .303-in. guns and not more than 12 lb. for .5-in. guns.

Remove all old oil from the lock and keep the front face and slide of the extractor, also the extractor levers, free from oil.

Try to prevent the water in the barrel casing from freezing by the following methods:—

- i. Wrap the barrel casing with straw, blanket, or sacking.
- ii. When dismounted, place the gun between the men of the section when resting.
- iii. Add to the water 20 per cent. of glycerine, 30 per cent. of glycerine residue, or 30 per cent. of glycol, whichever is available.

For ground service and both .303-in. and .5-in. guns in A.F.Vs. not fitted with header tank cooling system not more than 5 pints of the solution are to be used in the barrel casing.

For vehicles with the header tank cooling system the normal level should be maintained.

If the solution is allowed to boil the volume should be maintained by replacing the water boiled off.

In the case of the glycol solution a loss due to volatilization may occur, any deficiency resulting should be made good, care being taken that the strength of the solution is not increased.

Solutions of greater strength than those specified should on no account be used as it has been found that objectionable fumes may be given off, stronger solutions may have a detrimental effect on any rubber with which they come in contact.

- iv. It may sometimes be found useful to keep one lock wrapped in a dry rag in a man's pocket provided care is taken that he does not leave the gun position.

#### 50. Special instructions for Guns, machine, Vickers, .303-in., Mk. VI\* and VII

1. On assembling the gun in the mounting, care must be taken not to strain the union joint on the gun when making the connection to the water cooling system. The union nut need only be tightened sufficiently to prevent leakage at the joint. The pipe should be held square with the threaded portion of the joint and the nut screwed on with the finger and thumb. A slight movement of the pipe with the hand will facilitate assembly. One of the two spanners provided will be used to prevent the nut on the pipe rotating, whilst using the other to secure the union nut to the gun, undue force must not be used. Similar care must be taken in disconnecting and removing the gun.

2. To preserve the end cap from corrosion by water and gas from the muzzle-attachment, the gun casing should be wiped over with an oily rag. Care must be taken that oil does not come into contact with the rubber joint ring which will readily perish if it becomes greasy.

3. To prevent corrosion the gun mounting slides should be wiped with an oily rag before the guns are assembled in the mounting.

4. Care must be taken to see that the water circulating system is working satisfactorily. Any obstruction which might occur would prove dangerous during heavy firing.

5. A tool, removing gland, muzzle-attachment, Mk. III has been designed to enable the gun to be stripped and assembled whilst in the mounting.

#### 51. Points to be attended to before firing

1. The surfaces on which all movable parts work should be thoroughly well oiled with oil "A", especially the following:—

Bearing parts of the barrel and all recoiling portions.

The lock guides on the side-plates, also the working parts of the lock itself, especially the levers and extractor.

Face of the feed block.

Bearings of the crank, the extractor stop on the front cover, the curved ramps, lock guides and trigger bar on the inside of the rear cover, and the check lever.

2. In order to see that the recoiling portions work freely, cock the lock, remove the fusee spring box or fusee spring tube and spring, rotate the crank handle upward, take hold of it

with the right hand and the fusee with the left, move the recoiling portions backward and forward, to see that they work freely and also that the barrel goes right home in the forward position. The weight necessary to move the recoiling portions should not exceed 4 lb. for .303-in. guns and 6 lb. for .5-in. guns.

3. Replace the fusee spring and weigh it with the spring balance (see Section 64).

4. Thoroughly dry the bore, muzzle cup and muzzle-attachment. See that the muzzle cup is firmly screwed up. Examine the lock, feed block, firing lever, safety catch, etc.

5. See that the barrel casing is filled with water. To fill the casing of guns other than .303-in. Mk. VI\* and VII, remove the screwed plug at the top of the trunnion block and also the cork plug, if fitted, pour in the water and replace the plugs.

6. Ensure that the handles have been filled with oil, in Mk. .303-in. guns, and ascertain that the spare parts, boxes, etc., and their contents, and the cleaning rod, are with the gun.

7. Examine the belts and inspect the brass strips; see that the belts are correctly filled and packed carefully in the belt boxes. Keep the belts dry if possible; should they get wet lay them out to dry. New or stiff belts should be well plugged.

8. Should the water in the barrel casing become frozen, on the gun being fired the barrel will probably not recoil far enough to work the gun and will remain back. To remedy this, pull the crank handle on to the roller, then bring it back to a vertical position and force the barrel to the front, pulling the belt if necessary; let the crank handle return to the check lever and fire the gun. This should be repeated until the barrel recoils correctly.

9. In .303-in. guns (with the exception of Mk. VI\* and VII) see that the condenser tube is fitted.

#### 52. Points to be attended to during firing

1. See that a sufficient supply of water is kept in the barrel casing so that the barrel is never uncovered.

The water in the barrel casing begins to boil when the gun has fired, about 600 rounds in the case of .303-in. guns and about 250 rounds rapid in .5-in. guns; after this, if the firing is continued, the amount of water evaporated is about  $1\frac{1}{2}$  pints for every two belts fired.

2. The belt is on no account to be pulled when the gun is firing.

3. During a temporary cessation to fire, oil the lock and all frictional parts, remove a partly used belt and replace it by a

full one. When firing from the tripod see that the clamps of the tripod legs have not worked loose.

4. Keep the belt always in line with the feed block, and when firing from the tripod see that the ammunition box, if possible is up to, but not above, the crosshead joint pin.

5. See that the belts are refilled without delay.

6. See that the muzzle cup has not worked loose.

7. See that the condenser is attached to the condenser tube before the water boils.

8. See that repairs receive immediate attention.

### 53. Points to be attended to after firing

1. See that the gun is unloaded.

2. See that the chamber, bore and muzzle cup are well oiled immediately after firing.

3. See that the lock spring is released.

4. See that any live cartridges that happen to be among the cases are collected.

5. On return to barracks the gun and barrel should be thoroughly cleaned as soon as possible. The water must be drained out of the barrel casing. The lock should be examined to ensure that it is not damaged. The barrel must be removed and carefully dried and oiled, the outside of the barrel being oiled as well as the bore. Ammunition belts should be examined, and if wet or damp, should be hung up to dry.

### 54. Ammunition

This must not be subjected to extremes of temperature. It must be kept dry and clean, and when in belts must be examined daily and the rounds turned. Small particles of grit, sand, earth, etc., are very liable to get fixed to the rim of a cartridge, or even on the bullet. The result may be either a stoppage or a bulged barrel. On no account must ammunition be oiled.

### 55. Anti-gas measures

As a protection against gas, the lids of belt boxes must be kept closed, and guns covered with waterproof sheets. In the case of a gas attack, either hang the lock and work the recoiling portions, or keep the gun firing. After a gas attack, guns should be cleaned as soon as possible. Oiling will prevent corrosion for about 12 hours, but when opportunity occurs clean all parts in boiling water containing a little soda. All traces of gas must be removed from the ammunition with a slightly oiled rag, and then the ammunition must be thoroughly dried.

## CHAPTER V

### STOPPAGES

#### 56. Classification

Stoppages in the automatic action of the gun may be classed under two main headings :—

i. Temporary—which are due to :—

(a) Failure of some part of the gun of which a spare is carried.

(b) Faulty ammunition.

(c) Neglect of points before or during firing.

(d) Ignorance on the part of the gun team.

ii. Prolonged—which are due to failure of some part which cannot, as a rule, be put right by the team under fire or without skilled assistance. These necessarily put the gun out of action for a more or less prolonged period.



On the knowledge and training of the gun team depends the rapidity with which "temporary" stoppages can be overcome.

#### 57. Temporary stoppages and immediate action to be performed

Temporary stoppages can be overcome by immediate action which can be defined as :—"The automatic application of a probable remedy for the stoppage, based on the position of the crank handle."

The following table of temporary stoppages shows the various positions of the crank handle when the gun stops firing. These positions afford a ready indication of the "Immediate Action" to be performed. A detailed description of the "Immediate Action" and probable cause of stoppage is also given.

# Temporary Stoppages

Position of crank handle	Immediate action	Probable cause	Prevention of recurrence
I. 	i. Pull the crank handle on to the roller, pull the belt to the left front, and let go the crank handle.  ii. If, after carrying out (i), the crank handle stops in the same position when going forward, pull crank handle on to roller, open the rear cover, clear the face of the extractor, change the lock and reload.  iii. If failure recurs, repeat (i) and lighten fusee spring by 3 "clicks."	The extractor has not dropped. This may be due to: i. Weak charge. ii. Weak or broken gib spring.  iii. (a) Too heavy fusee spring. (b) Want of oil in working parts. (c) Grit in working parts. (d) Excessive packing. (e) Worn barrel. (f) Tight pockets. (g) Friction due to frozen oil or water.	i. Attend to points before and during firing.
II. 	i. Force the crank handle to the rear and call out "clearing plug", open the rear cover, lift up lock and examine the cartridge on the face of the extractor. If a damaged cartridge, or an undamaged cartridge with the front portion of a separated case adhering to it is found, call out "don't want it", clear the face of the extractor and reload.	i. (a) Damaged cartridge. (b) Separated case with front portion withdrawn telescoped on undamaged cartridge.	i(b) and ii. If a succession of separated cases occur the connecting rod must be lengthened if a change of lock effects no improvement.


**Indication—**  
The lock is unable to come back far enough to allow the extractor to drop.

**Indication—**  
The lock is unable to go fully home after recoil.

## Temporary stoppages—continued

Position of crank handle	Immediate action	Probable cause	Prevention of recurrence
	ii. If an undamaged cartridge, with no front portion of separated case adhering to it is found on the extractor, clear the face of the extractor, replace the lock, keeping the crank handle on the roller.  Take the clearing plug (seeing that the centre pin is back) and insert it into the chamber.  Push the pin well home by allowing the lock to go forward slowly, keep a firm pressure on the crank handle, give the clearing plug a rocking motion; withdraw the lock; strike back the handle of the clearing plug and withdraw it (seeing that the front portion of the separated case is on the clearing plug) and reload. With the later pattern, i.e. Plug, clearing, .303-in. M.G., Mk. I, lift out the lock and insert the rim of the plug into the guides of the extractor and position the plug in the recess in the gib. Reassemble the lock and allow it to go right forward thereby inserting the plug into the chamber. Rotate the crank handle, withdraw the lock and remove the plug (seeing that the front portion of the separated case is on the clearing plug) and reload.	ii. Separated case. Front portion remaining in chamber.	


## Temporary stoppages—continued

Position of crank handle	Immediate action	Probable cause	Prevention of recurrence
III.  <p><i>Indication</i>—The extractor is unable to rise to its highest position. If the feed block slide is jammed, there is a fault in feed.</p>	i. Slightly raise the crank handle, pull the belt to the left front, let go the crank handle and then strike it down on the check lever.  ii. If the stoppage recurs, repeat the immediate action, unload, oil the working parts, and reload. iii. If (i) fails, examine feed block slide. If jammed, No. 1 calls out "feed block", pulls the crank handle on to the roller,* raises the rear cover and hangs the lock. No. 1 then draws back the recoiling portions while No. 2 depresses the pawls and withdraws the belt. No. 1 then allows the recoiling portions to go forward thus allowing the feed block slide to go over to the left. No. 2 then straightens the rounds in the belt. No. 1 will then lower the rear cover, pull the crank handle on to the roller, pull the belt to the left front and let go the crank handle.	i. A cartridge is fed up slightly crosswise.  ii. Friction in lock, etc.  iii. (a) Bent or damaged long brass strip. (b) Badly-filled belt. (c) Worn or loose belt pockets. (d) Belt box not in line with the feed block.	i. Examine cartridges in belt.  ii. Attend to points during firing.  iii. Attend to before and during firing. <i>Note.</i> —Badly filled belts are the chief cause of stoppages in the third position.

*Note.*—The effect of a fault in feed is that the top pawls, being engaged behind a cartridge in the belt, are held fast, when some obstruction, such as above, prevents the belt from passing freely through the feed block. The recoiling portions being connected by the top and bottom levers to the slide, are arrested and prevented from going home. The distance they are held back depends upon the point at which obstruction asserts itself.

\* In order to do this, it may sometimes be necessary for No. 2 to force down the horns of the extractor.

## Temporary stoppages—continued

Position of crank handle	Immediate action	Probable cause	Prevention of recurrence
III. continued.  IV.  <p><i>Indication</i>—There has been no explosion, or, if any, there has been little or no recoil, the lock remaining in its forward position.</p>	iv. If slide is free, No. 1 calls out "Extractor," and opens the front cover. No. 2 forces down the horns of the extractor. No. 1 clears the face of the extractor. No. 2 depresses the pawls, withdraws the belt and removes the first cartridge in the belt, and then No. 1 closes and locks the front cover and reloads.  i. Pull the crank handle on to the roller, pull the belt to the left front and let go the crank handle. ii. If (i) fails, pull crank handle on to roller twice, change lock and reload.  iii. If when performing (i), No. 1 notices that more belt than usual comes through to the left, he performs the second half of the loading motions.	iv. Thick rimmed cartridge.  i. Defective ammunition.  ii. (a) Broken or damaged firing pin. (b) Broken lock spring.  iii. Empty pockets in the belt.	iii. Inspect belts.

*Note.*—Worn or damaged side or extractor levers may result in the extractor being unable to rise, or, if the side levers are bent, there may be either a succession of separated cases, or the lock may become jammed.

### 58. Stoppages not included in I.A. table

1. The causes of prolonged stoppages are so varied that they cannot be set out in detail. The following are, however, of importance.

2. *Parts of the lock damaged* (no spare parts being available).—The gun will fire single shots without sear, or, if the bents of the sear or firing pin are badly worn or broken off, but this can only be done by pressing and releasing the thumb-piece quickly.

The gun will also fire "rapid" without the sear, but only for a short period, when the firing pin will probably be broken.

The gun will fire if the nose of the trigger or bent of the tumbler is badly worn or broken off, or, if the short arm of the lock spring is broken and engages on the trigger above the trigger axis pin, but the firing cannot be controlled by the thumb-piece or trigger. In this case the gun will fire the instant the crank handle reaches the check lever, although the thumb-piece has not been pressed, or, if the defect occurs during firing, the gun will not cease firing when pressure on the thumb-piece has been released. To remedy this, firing should be stopped by throwing the filled end of the belt over the breech casing. If this results in a third position stoppage, No. 1 will hold the crank handle in his right hand and open the front cover. No. 2 will press down the horns of the extractor. No. 1 will then close the front cover and pull the crank handle on to the roller, while No. 2 will remove the belt from the feed block, until the first round is level with the belt box. No. 1 will then let the crank handle fly forward on to the check lever to fire the round on the face of the extractor. The lock can now be changed with safety. On no account should the crank handle be allowed to fly forward until the belt has been removed from the feed block.

If a fourth position stoppage is the result, No. 2 will remove the belt as before. No. 1 will then pull the crank handle on to the roller and allow it to fly forward on the check lever, when the live round, which may be on the face of the extractor, will be fired.

The lock can now be changed with safety.

If no spare lock is available the gun can be worked as follows :—

- (a) Group the cartridges in the belt, say 20 or 30 rounds in each group.
- (b) Lay the gun before commencing to load, pull the crank handle on to the roller, pull the belt and let the crank

handle go; repeat, but, before allowing the crank handle to reach the check lever and the gun to fire, grip the rear-crosspiece with the left hand, to control the gun in the ordinary way.

A broken gib spring may also give a No. 1 stoppage.

In A.F.V. pattern guns a damaged detent or damaged ejection check will also cause a recurring stoppage. The crank handle will probably be found in the No. 1 position or slightly to the rear of that position. "Immediate Action" will not clear the gun, the crank handle stopping in the same position; the action therefore is to open the rear cover, lift the extractor, hang the lock and remove the trigger guard, when an empty case or cartridge will fall out.

To remedy, exchange the lock and at earliest convenience examine the detent. If the stoppage recurs examine the ejection check and fit new check, or spring, as necessary.

3. *Broken fusee spring or fusee*.—The gun will stop firing and the crank handle will be found to be resting on the roller.

To remedy proceed as follows.

Return the crank handle to the check lever, remove the fusee spring box and spring. Remove the spring from the adjusting screw. (If fusee is broken remove it from its seating.) Reassemble new spring or fusee, replace fusee spring and box, reload, relay and open fire.

4. *Muzzle-attachment*.—In case of any damage to the muzzle-attachment, necessitating its removal, reduce the weight of the fusee spring by about two to three pounds.

5. *Breakages in the feed block*.—It is a peculiarity of the feed block that whatever moving part is broken, the same mechanical fault occurs in the feeding of the gun, *i.e.* the gun will fire until there are no rounds left on the face of the extractor.

The lock will then be found home and the crank handle in the No. 4 position.

If the normal I.A. for that position is performed it will be seen that the lock must be changed, and that on reloading and firing being resumed the gun will only fire two rounds, and the same stoppage will occur again. This peculiarity, which shows itself by the fact that continuous changing of the lock only results in two rounds being fired at each exchange.

Parts of the feed block most liable to breakage are :—

1. Lower lever.
2. Upper lever.
3. Top pawls or spring.
4. Retaining pawls or spring.

## 59. Summary of causes of stoppages

- First position ... Weak charge.  
Weak or broken gib spring.  
\*Too heavy fusee spring.  
\*Want of oil, or grit in working parts.  
\*Excessive packing.  
\*Worn barrel.  
\*Tight pockets in belt.  
\*Friction due to frozen oil or water.
- Second position ... Damaged cartridge.  
Separated case.
- Third position ... Cross-fed cartridge.  
\*Friction on lock.  
Bent long brass strip.  
Badly-filled belt.  
Torn or worn belt.  
Loose pockets in belt.  
Belt box not in line with feed block.  
Thick rimmed cartridge.
- Fourth position ... Defective ammunition.  
Broken or damaged firing pin.  
Broken lock spring.  
Empty pocket in belt.
- Special position ... Broken muzzle cup.  
Broken fusee spring.  
Nose of trigger or bent of tumbler worn or broken.  
Damaged cartridge grooves.  
Broken gib spring.  
Broken gib.  
\*Damaged detent or spring.  
\*Damaged ejection check.

**Note.—Recurring stoppages are starred thus \*.**

## CHAPTER VI

### REPAIRS AND ADJUSTMENTS

#### 60. General remarks

It is necessary that all machine gunners should be able to carry out any of the minor repairs enumerated below. Armourer's services are not always available at a critical moment, and the maintenance of a gun in action under such circumstances entirely depends on the ability of a gunner to carry out minor repairs.

#### 61. Instructions for fitting spare discs for the muzzle-attachment

Unscrew the front cone. Cut the edge of the disc, driving sufficient metal up to provide a hold for the pliers. Remove the disc and replace it with a new one. In replacing, it may be necessary to tap the disc on to the front cone.

#### 62. Instructions for lateral adjustment of the foresight of Mk. I 303-in. guns

1. This will only be carried out by an experienced N.C.O.
2. It will be carried out on a 30 yards range.

3. *Target.*—Any target with a thick vertical line as an aiming mark with a pencil line  $\frac{1}{8}$  in. to the right of the centre of the thick line. The latter will be invisible to the firer.

4. Settling bursts will first be fired. Then a group of 10 rounds will be fired by inserting the No. 3 punch between the firing lever and safety catch. If the gun is sighted correctly the mean point of impact will be on the thin pencil line, i.e.  $\frac{5}{8}$  in. to the right of the point aimed at.

If there is any lateral error the foresight will be tapped in the same direction as the error using a No. 3 punch and a hammer.

Another burst of 10 rounds will be fired after each adjustment until the sighting is correct. Adjustments are very fine and great care must be exercised in tapping the foresight. When the foresight is very tight the bracket should be supported to prevent it from jarring loose.

5. If fired from the tripod it is important that the socket should be perfectly upright. After each group is fired the aim must be carefully checked to see that the tripod has not moved.

### 63. Perforation of the barrel casing

1. In the event of the barrel casing being pierced by bullets, etc., the gun being thus out of action, repairs will be carried out locally in accordance with the following methods, to enable the gun again to take its place in the firing line with the least possible delay.

- i. Temporary "first aid" repairs to be carried out by the gun team.
- ii. Semi-permanent repair to be carried out by an armourer when opportunity occurs.

2. To effect (i), take one of the rubber pads from the spare parts box, place over the hole, position the metal plate on top and retain the whole by two of the flexible metal clips around the barrel casing.

The methods described will not remedy the defect when there is a hole in the end cup into which the tubular portion of the casing is screwed.

3. The following stores are supplied to enable the repair at (i) to be carried out:—

Patches, first aid.

Pads	..	..	2	} to be carried in a tin box in the spare parts box.
Plates	..	..	2	
Clips	..	..	4	

### 64. Instructions for weighing and adjusting the fusee spring

With the spring balance, proceed as follows. Take out the lock, place the loop of the spring balance over the knob of the crank handle and, standing on the left side of the gun, press down the check lever with the left hand. Pull the balance vertically upward, resting the wrist on the breech casing; the reading indicated, when the crank handle begins to move, will be the weight of the fusee spring. This weight should be between 7 and 9 lb. for .303-in. guns and between 12 and 14 lb. for .5-in. guns.

If the spring is over or not up to weight, adjust by means of the vice pin; generally six clicks (three revolutions) make a difference of about 1 lb. Turning the vice pin upward decreases the weight, and *vice versa*. The tension of the fusee

spring should always be kept as high as possible, consistent with maintaining the normal rate of fire of 500 rounds a minute.

### 65. Instructions for weighing the recoiling portions

1. Remove the fusee spring.
2. Place the crank handle nearly vertical.
3. Place loop of spring balance over the boss of the crank handle and pull slowly to the rear.
4. Weight should not exceed 4 lb. for .303-in. guns and 6 lb. for .5-in. guns.

### 66. Instructions for adjusting the length of the connecting rod.

1. If a succession of separated cases occur on service during actual firing, the lock should be changed, and if still no satisfactory result is obtained, the Nos. 1 and 2 washers should be placed over the adjusting nut as a temporary measure.

2. The adjustment of the connecting rod should be effected in action by two washers, but subsequently, when time permits, single washers should be used, if necessary, to secure fine adjustments.

3. At the earliest opportunity the guns should be handed to the armourer for testing and adjusting the length to his gauge.

*Note.*—As the gun lock and the spare lock may vary somewhat in length, the longer of the two should be adjusted as close as possible in order to avoid separated cases when the shorter is taken into use, but care must be taken not to over-washer as this will cause stoppages.

### 67. Instructions for the renewal of packing

1. *To renew the packing at the breech end of the barrel.*—Should the gun leak at the breech, empty the barrel casing. Draw out the recoiling portions. Wind a strand of asbestos (part of a 5-yds. piece) in the cannellure of the barrel, pressing it together with a thin piece of wood or the point of a screw-driver or knife until the cannellure is full, then oil the asbestos, smooth it down flush with the barrel and reassemble the parts.

2. *To renew the packing at the muzzle end of the barrel.*—Should the gun leak at the muzzle, stand the gun on the rear-crosspiece, remove the muzzle-attachment and unscrew the gland. Repack, or, if necessary, replace the asbestos, having

first oiled it, by winding it loosely round the barrel, and whilst winding, push it in with a No. 3 punch, a piece of wood, or any blunt-ended instrument which will fit; screw on the gland, as tightly as can be done by hand, return the gun to a horizontal position, hang the lock, and work the recoiling portions backward and forward to ensure that they move freely. If the packing is found to press too hard on the barrel, the gland should be removed and one or two strands of the asbestos taken out. Finally, see that the gland is screwed firmly home to the barrel casing.

### 68. Lock repairs

To replace any part of the lock the ordinary sequence for stripping the lock must be followed until the required part is reached.

In the case of a lock spring, where the broken portions fall clear, a new lock spring may be assembled without stripping the lock.

When replacing parts other than the extractor, gib or gib spring, the extractor need not be removed.

## CHAPTER VII

### EXAMINATION

#### 69. General remarks

The guns should be given a brief examination daily whilst cleaning is being carried out as described in Chapter IV. In addition a more detailed examination should be carried out frequently—a list of points for examination is given below. When guns are taken over from another gun team or unit a careful examination should be carried out immediately.

#### 70. Points for examination

##### (a) All guns

##### 1. Lock.

i. *Side and extractor levers.*—(i) Remove feed block, and keep the front cover raised. (ii) Draw back the crank handle, and let it go slowly forward on to the check lever. (iii) If correct, the extractor should now be in its highest position.

ii. *Bents of sear and firing pin.*—(i) Pull crank handle on to roller. (ii) Press the thumb-piece and, whilst maintaining pressure, let the crank handle go slowly forward on to the check lever. (iii) The extractor should be kept up to its highest point before the sear releases the firing pin.

iii. *Extractor.*—(i) Remove lock. (ii) Examine the face for burrs and flaws. (iii) Try the grooves with the armourer's dummy to see if the cartridge would be held horizontally. (iv) If detent is fitted ensure that it functions correctly.

iv. *Nose of trigger and bent of tumbler.*—(i) Cock the lock. (ii) Release the sear; the firing pin should now be held back.

v. *Firing pin.*—See that the point is not broken. A broken firing pin can be recognized without stripping the lock by releasing the lock spring with the extractor up. If correct the firing pin will then protrude from the firing pin hole, and can be withdrawn by raising the tail of the tumbler. If it does not protrude, or, if protruding, the point is not withdrawn when the tail of the tumbler is raised some part of the firing pin is broken.

vi. *Lock spring.*—Test weight as follows:—(i) Fully cock the lock. (ii) Place bottom of the lock on a flat surface. (iii) Place the left hand on the top of the

lock and the loop of the spring balance over the side lever head. (iv) Draw the side lever head upward with the spring balance, when the balance should record from 12 to 14 lb. for .303-in. locks and from 15 to 18 lb. for .5-in. locks.

2. *Feed block*.—(i) Examine the stud for burrs and flaws. (ii) Split keeper pin in position. (iii) Free working of the slide. (iv) Pawls and pawl spring in good condition. (v) Cartridge guides not burred.

3. *Barrel*.—For daily examination, use the mirror reflector or the inspection holes in the rear-crosspiece and crank. The only certain way is to remove the barrel from the gun. The barrel should be carefully examined for rust, cuts, erosion, nickelling, cord-wear and bulges. Proceed as follows :—

- i. Remove the barrel from the gun.
- ii. First with the eye close to the breech, then with eye some inches back from the breech, examine the bore, rotating the barrel slowly. Carefully examine the lead to see if undue erosion has taken place.
- iii. The barrel should now be reversed and examined carefully from muzzle end in a similar manner.

4. *Packing*.—Fill the barrel casing with sufficient water to cover the barrel and work the recoiling portions; there should be no leakage.

5. *Axis pins, etc.*—See that all the axis pins are correct; also the chains securing the component parts.

6. *Steam tube*.—(i) Keeper screw in correct position. (ii) Free movement of the slide valve. This can be ascertained by giving the gun a rocking motion, when the movement of the valve should be distinctly heard.

7. *Front cover catch*.—See that it works correctly.

8. *Rear cover lock or catch*.—(i) Automatic fastening of the rear cover when lowered. (ii) Cover lock screwed axis pin fully screwed home in Mk. I .303-in. guns.

9. *Safety catch*.—Automatic action of spring and catch.

10. *Trigger bar and spring*.—See that the spring returns the trigger bar forward quickly. Inspect trigger bar for roughness and burrs.

11. *Fusee spring and fusee*.—(i) Threads of the adjusting screw in good order. (ii) Vice pin not bent. (iii) Correct weight. (To weigh and adjust, see "Repairs and Adjustments," Chapter VI). (iv) Fusee and chain in good condition. (v) In .303-in. guns that the hook is in good condition.

12. *Recoiling portions*.—Remove fusee spring and work the recoiling portions backward and forward; if the recoiling

portions move freely (for weight, see "Repairs and Adjustments," Chapter VI) they are correct. If not, look for the following :—

- i. Too tight packing.
- ii. Dented side of the breech casing and consequent bearing on the side-plates.
- iii. Slightly bent or damaged side-plates.

13. *Connecting rod*.—Examine as detailed in "Repairs and Adjustments," Chapter VI.

(b) *Mk. I .303-in. guns*

\*1. *Muzzle-attachment* (outer casing).—Disc clean and in good condition, free from burrs and fouling.

\*2. *Muzzle cup*.—(i) Clean and free from rust. (ii) No sign of flaws.

\*3. *Foresight*.—Blade in good condition.

\*4. *Tangent sight*.—(i) Aperture of fixed sight on stem and pillar and aperture of the slide in good condition. (ii) Free working of the slide. (iii) Top and bottom screws securely fixed.

5. *Firing lever*.—(i) See that the firing lever cannot be pressed home unless the safety catch is raised. (ii) See that the trigger is released before the firing lever bears against the stop on the safety catch, when the latter is raised.

6. *Sliding shutter*.—(i) The sliding shutter should not require any undue effort to move it by hand. If it does, look for :—

(a) Dirt or grit.

(b) Dented bottom plate, probably due to the dropping of the connecting rod on it when the lock is out of the gun.

(ii) See that the catch and spring work automatically.

(c) *A.F.V. pattern guns*

1. *Gland, muzzle-attachment or gland, packing*.—On guns where a locking device is fitted ensure that the engagement of such lock prevents rotation of the gland.

2. *Trigger guard*.—(i) Examine the finger trigger to ensure a smooth action. (ii) See that the safety catch plunger rises under the action of its spring when the finger trigger is released. (iii) Examine the trigger guard catch and see that it engages when the guard is assembled to the gun. (iv) If a loading catch is fitted examine and function the gun with the catch in operation.

3. *Joint ring*.—Must be in good condition and correctly seated in the cannellure of the end cap or packing gland.

*Note*.—\* Also applies to .303-in. A.F.V. pattern guns.

## CHAPTER VIII

### APPURTENANCES

#### 71. Director, No. 9, Mark I

(Plates XXXI to XXXIII)

#### PREFACE

The director is an instrument for measuring angles in connection with the control of indirect gun fire. Angles are required to be measured in both the vertical and horizontal planes. Horizontal angles are measured 180 degrees left or right of some arbitrary reference point; vertical angles are required to a limited extent, and are always measured from the horizontal. Errors are caused if the planes of measurement are not truly horizontal and vertical; means must therefore be provided to ensure this.

The essential requirements are as follows:—

- (a) Two independent all round movements in azimuth; one which fixes the zero of the scale in any desired direction, and the other which measures horizontal angles from this direction.
- (b) An angular movement in the vertical plane to an amount dependent on the purpose for which the instrument is designed. A levelling bubble is necessary to indicate the horizontal position.
- (c) A means of levelling the instrument, and bubbles to indicate when correct levelling has been established.

The following auxiliary requirements are also necessary:—

- (a) A stand on which the instrument can be supported to give steadiness.
- (b) A telescopic system, and a slow motion gear to give accuracy in laying and measurement.
- (c) Means of providing a free motion independently of the gear for rapid setting.
- (d) A solid construction for stability and service conditions.

- (e) A light and compact design for portability.

The method of measuring angles in most general use is by measuring the rotation of the line of sight against a scale of angles. An alternative method, which is quicker and sufficiently accurate for some purposes, is to measure the angle

directly against a graticule scale in the field of view of the telescope.

The accuracy of measurement of angles depends on:—

- (a) The acuity of observer's vision.
  - (b) The mental and physical state of the observer. This is influenced by his comfort, *i.e.* position, inclination of the telescope eyepiece and degree of movement of the head during use. These factors require consideration in the design of the instrument.
  - (c) The magnification of the telescope system. The accuracy increases with the magnification up to about 30 diameters under conditions of very good illumination. Other conditions such as the size of the field of view, with its effect on rapid laying, and the size of the telescope which varies with the magnification, also influence the magnification to be adopted.
  - (d) The accuracy of setting up. This depends on the sensitiveness of the bubbles and the mechanical means of levelling provided. The levelling bubbles must not be too sensitive, or the time spent in levelling is not justified by the accuracy required.
  - (e) The accuracy of the instrument. This depends on its construction, *e.g.* the graduation of the scales and the design of bearings and adjustments.
  - (f) The external conditions during observations. Accuracy is affected by atmospheric conditions such as visibility, air temperature and wind, with the consequent effect on the ease of observation and the comfort of the observer.
- It will be seen from the above that the design of a director must always be a compromise between accuracy and portability, and that any addition to the serviceability necessitates a sacrifice as regards weight.

#### DESCRIPTION

The No. 9 director was introduced into the service in 1936 to meet the requirements of a light and accurate director for machine guns. Plate XXXI shows a general view of the director, the principal parts of which are as follows, and Plate XXXII shows the director dismantled.

Pivot bearing  
Worm wheel  
Azimuth scale ring  
Adjusting screw bearing  
Body  
Worm spindle  
Telescope

The *pivot bearing* (1), of manganese bronze, supports the mechanism of the director and provides the means for attachment to the pivot of the stand to which it is clamped by means of a gunmetal screw (2). The pivot bearing is formed with an arm on which is mounted an index. The index on the arm is employed in conjunction with the index on a bracket attached to the azimuth scale ring (3) for the initial orientation of the zero of the azimuth scale.

The *worm wheel* (4) is carried on the azimuth scale ring, to which it is secured by four brass screws and positioned by two steel steady pins. It is hobbled with 72 teeth, so that one turn of the worm spindle will traverse the line of sight of the telescope through 5 degrees. In some directors the worm wheel and the azimuth scale ring are formed in one piece.

The *azimuth scale ring* (3), of gunmetal with a nickel silver ring sweated on and lacquered, is graduated from 0 to 180 degrees left and right of zero in multiples of 5 degrees. All 10 degree graduations are numbered and every 5 degree graduation lettered L or R, the letters signifying left and right direction respectively. The azimuth scale ring rotates in azimuth through a limited amount (about  $5\frac{1}{2}$  degrees) on the pivot bearing. This amount is limited by the adjusting screw bearing (5), which is attached to the bottom of the azimuth scale ring.

The *adjusting screw bearing* (5) is prepared with a screwed bearing for a nickel silver adjusting screw (6), and a socket which, with a screwed plunger spring retaining cap (7), holds a brass plunger and spring.

The index arm on the pivot bearing works between the plunger and adjusting screw, the latter being employed for the final adjustment of the orientation of the zero on the azimuth scale.

The *body* (8) is mounted on the pivot bearing over the worm wheel and is retained in position by a plain and a screwed collar. A cover plate over the screwed collar prevents ingress of dirt into the mechanism of the director. The body is also fitted with a socket for the reception of a bubble case with a "bubble, spirit, glass, circular, No. 1, Mk. I", and with a bearing for the worm spindle (9). The body is provided with two telescope bearings, left and right, which are positioned by steady pins and secured by screws. The right telescope bearing is prepared with a longitudinal socket for the reception of an elevating screw, with a knurled head for actuating purposes, and a spring which is mounted on a pin to retain the telescope in position in the vertical plane. The right trunnion of the telescope body is fitted with a lug which operates between the elevating screw and the spring. The elevating

screw can move the telescope through an angle of  $-10$  degree to  $+15$  degrees.

The *worm spindle* (10) is mounted in the body and is in gear with the worm wheel. It is provided with two bearings, left and right, which are eccentrically fitted on the body, so that, by the action of the hand on an actuating lever, the worm spindle can be thrown out of gear with the worm wheel for the quick setting of large angles of direction. Between the two bearings are right and left-handed phosphor bronze torsional springs, which keep the worm engaged with the worm wheel. A knurled head fits over a squared portion at each end of the worm spindle and is secured by a retaining screw which is fixed in position by a steel grub screw.

A *micrometer drum* (11) is clamped in position by three screws, between the knurled head and a clamping collar on each end of the worm spindle. These drums are graduated every five minutes from 0 to 5 degrees; the whole degrees are numbered and marked R or L as the case may be. By slacking off the three screws on each side, the graduated drums may be made to agree with each other and with the azimuth-scale index, which is marked on the body.

The *telescope* (12) is of a prismatic type with fixed focus and provides a field of view of 12 degrees 30 minutes, which with a magnification of three diameters, gives an apparent field of view of  $37\frac{1}{2}$  degrees. At the principal focus of the telescope is placed a glass diaphragm on which is etched a vertical central line. On this line, for 5 degrees either side of zero, which is in the centre of the field of view, are graduations every 10 minutes numbered at every degree.

The telescope is designed in the form of a triangular box to contain the prisms and provide the means for attachment for the eyepiece and the object glass. The prisms are retained on their seatings by two hard rolled brass retaining springs and cork pads. Two cover plates are provided with holes through which the eyepiece cell and the object glass cap are screwed into the body. The object glass cap (13) contains the object glass (an achromatic doublet) which is retained in its cell by a screwed ring. The eyepiece cell has an inner shoulder which forms a stop for the field lens in its cell, into which screws the cell of the eye lens, the whole being secured by the eyepiece cap.

The body of the telescope carries a bracket into which a "bubble, spirit, glass, B" is set in plaster.

A leather case (14, Plate XXXIII) fitted with a shoulder strap (15) is provided. This case has a felt pad at the top and bottom to hold the director which is inserted base first into the case.

## CARE AND PRESERVATION

The director is designed to withstand service conditions and is subjected to a rough treatment test before issue.

It is, however, at all times necessary to guard against excessive jolting or a blow to the instrument such as might occur if it were mishandled or dropped.

## CLEANING

*Moisture.*—The director should, whenever possible, be protected from damp. If used in the rain it should be wiped dry before replacement in its case. If interior glass surfaces become filmed with moisture to such an extent as to interfere with its use, the director should be returned to the R.A.O.C. for cleaning without undue delay.

*External glass surfaces.*—To avoid loss of light the object glass and eye lens should always be clean. No oil or grease should be allowed on them and they should not be touched with the hands.

Instructions for cleaning when dirty.

(a) If free from grease, wipe the glass surface with a clean piece of soft linen, silk or tissue, frequently using a fresh portion of the material so as to avoid scratching the glass with grit already collected.

(b) Grease should be cleaned off the glass and edges of the mount with a clean piece of soft linen slightly dampened with rectified turpentine or benzine, and the surface afterwards wiped as in (a).

(c) Cleaning cloths for optical parts should be kept under cover in order to ensure that they are free from dust, and should not be used for any other purpose. They should be washed frequently, all soap being carefully rinsed out.

*External metal surfaces.*—These should be cleaned with a dry cloth.

## STORAGE

The director should be kept in a dry store at as even a temperature as possible. Although the telescope is sealed, variations in temperature may cause air to be drawn in, and any moisture present may condense on the internal optical parts, causing film.

When directors are to be stored for long periods in damp tropical climates, they should be taken from their cases and stored in a reasonably air-tight case containing a tray of calcium chloride.

## 72. Stand, instrument, No. 28, Mk. I

(Plates XXXI and XXXIII)

The *No. 28 instruments stand*, which is a tripod stand with telescopic legs, was introduced into the service in 1936 for use with the No. 9 director.

Plate XXXIII shows the stand which consists principally of a base plate, a ball joint and three telescopic legs which permit of adjustment of the stand for height to suit the operator of the director.

The *base plate* (16) is formed with a hemispherical recess to receive the ball joint, and three projecting lugs for attachment of the legs. A recess in the plate carries a phosphor bronze anti-friction ball which works in a guide groove in the ball joint. This permits the ball joint to rotate in the base plate through about 22 degrees in any vertical plane, but prevents rotation in a horizontal plane.

The *ball joint* (17) is formed with a pivot for the pivot bearing of the director, and a screwed portion to take the protecting cap (18) which is secured to one of the legs of the stand by a solid link brass chain. At the lower end is a screwed brass spindle by means of which with a wing nut and a collar the ball joint is clamped to the base plate.

The *legs*, of mahogany, are fitted with manganese bronze shoes, and prepared with brass washers at the upper ends to form bearings for attachment to the base plate by means of hinge bolts. Wing nuts are fitted to the hinge bolts to clamp the legs, and a keep screw is inserted in the end of the hinge bolt to prevent the wing nut from being totally withdrawn.

One of the legs is provided with a strap to secure the three legs when folded.

## 73. Plotter, machine gun, No. 1, Mk. I

(Plate XXXIV)

The *No. 1 machine gun plotter* was introduced into the service in 1936 for use with Vickers .303-in. machine guns with Mk. VII ammunition. It is employed in conjunction with the No. 9 director for indirect laying to enable the line of fire to be picked up from an observation post at any distance up to 2,000 yards from the gun position.

Plate XXXIV shows the plotter which consists principally of a body, two scale arms, two index plates, two vernier scale plates and three bolts with milled nuts for clamping the body, scale arms and index plates respectively.

The *body* (1) is in two parts, upper and lower, and each part

supports a scale arm. The two parts of the body are free to slide over each other to an extent representing 2,000 yards, on an engraved scale, the displacement of one with respect to the other being read by an index arrow (2) on the end of each part of the body. A clamping bolt and milled nut (3) are provided.

The *scale arms* (4) are pivoted on lugs on the body. Each is engraved with direction, range and tangent elevation scales, which are graduated as follows.

(a) The direction scale from 0 to 185 degrees in multiples of a degree with every 5 degrees graduation numbered from 0 to 180.

(b) The range scale from 500 to 3,000 yards in multiples of 50 yards with every 100-yard graduation numbered.

(c) The tangent elevation scale from 30 minutes to 11½ degrees in multiples of 10 minutes with every whole degree graduation numbered.

The scale arms are free to move round their pivots when unclamped for the purpose of setting or obtaining certain angles and ranges or tangent elevations.

The *index plates* (5) with their clamping bolt and milled nut (6), form the connection between the scale arms. They are engraved with two indices, one for the range scale and the other for the tangent elevation scale.

The *vernier scale plates* (7) are attached to the body. They are engraved with an index for the direction scale, and a vernier scale reading from 0 to 60 minutes in multiples of 10 minutes. The vernier scale is employed for setting direction angles containing fractions of a degree.

A *case* (8), of leather, with a sling for carrying purposes, is provided. The case is secured by two leather straps and roller buckles. Inside the case two wood blocks covered with chamois leather hold the plotter securely.

#### 74. Clinometer, Vickers 303-in. machine gun, Mk. II

(Plate XXXV)

The *Mk. II Vickers 303-in. M.G. clinometer* was introduced into the service in 1933, to replace the *Mk. I* clinometer from which it differs in having the cradle dovetailed into the base and secured by two screws instead of being secured by two screws only. The *Mk. I* clinometer was introduced in 1918 to provide a means of laying the Vickers 303-in. machine gun for elevation, the clinometer being set to the required angle and placed on top of the sides of the gun after first raising the rear cover.

Plate XXXV shows a general view of the clinometer the

principal parts of which are the cradle, base, arc and worm spindle.

The *cradle* (1) is a manganese bronze casting, having a guide cut in the upper surface in the form of the arc of a circle, in which the arc (2) can slide; the under surface is formed in a V-wedge to fit the base, to which it is secured by two steel screws.

A scale is graduated on one face of the cradle, from 0 to 20 degrees on either side of a central zero, in multiples of single degrees, with every 5 degree graduation numbered from 0 to 20D on the left hand side, and from 0 to 20E on the right hand side. D and E denote angles of depression and elevation respectively.

The centre of the cradle is hollowed out to receive the worm spindle which is supported in front and rear bearings. The rear bearings form a pivot about which the worm spindle can be rotated in the vertical plane to disengage it from the arc, whilst the front bearing is slidably mounted to permit of this disengagement. The teeth of the worm spindle are forced against the worm wheel of the arc by means of a flat steel spring (No. 1 clinometer spring) which is secured to the inside of the bottom of the cradle.

The *base* (3), of cast steel, is formed on the underside with two bearing surfaces which rest on the gun. The top surface is marked with an arrow to indicate the direction of the target.

The *arc* (2) is shaped to slide evenly in the cradle. On its under surface are cut teeth with which the worm engages. Attached to it by two screws is an adjustable reader (6) for the degree scale. Its upper surface is shaped to take a "bubble, spirit, glass, L".

The arc is prevented from becoming detached from the cradle by a stop screw passing through the back of the cradle and coming in contact with stops at either end of the arc.

The *worm spindle* is of manganese bronze with a worm cut on the central portion. Pinned on each end of the spindle are front and rear micrometer collar bushes which are screwed externally to take a milled nut (4) by which the front and rear micrometer collars can be clamped to the bush. Between the nut and the micrometer collar is a washer, having two feathers to prevent it turning. The micrometer collars are divided in multiples of 5 minutes and are numbered at each 10 minutes from 0 to 50E and from 50D to 0 respectively. One turn of the worm spindle represents 1 degree.

To the rear end of the worm spindle a milled head (5) is firmly attached and secured with a taper pin.

The clinometer is provided with a leather case (7) fitted with a shoulder strap. The inside of the case has wood and

felt fittings to house securely the clinometer; and the case is secured by a strap and brass buckle.

The clinometer should be set to zero before inserting in the case.

### 75. Sight, dial, M.G., Mk. III

(Plates XXXVI and XXXVII)

#### DESCRIPTION

The *M.G. dial sight* consists principally of the following components:—

- Bracket
- Levelling lever
- Angle of sight drum
- Angle of sight drum friction clamp
- Angle of sight drum lever
- Body
- Range drum
- Range drum clicker arm
- Worm spindle bearing
- Deflection gear worm spindle
- Deflection gear clicker lever
- Dial worm wheel
- Dial
- Lensatic sight worm carrier
- Lensatic sight pivot bracket worm wheel
- Zero latch
- Lensatic sight pivot bracket
- Carrier lensatic sight
- Lensatic sight
- Emergency level.

The *bracket*, of bronze, has its rear part prepared with bevelled surfaces to fit into a suitable bracket secured to the machine gun.

The rear lower part is prepared with a screw-threaded hole to receive a clamping screw formed with a knurled head and fitted with a register pin riveted in position.

The front extension of the bracket is bored horizontally to receive a steel spindle which is secured by a taper pin. The spindle, which carries the sight components and extends towards the left, is case hardened and prepared with helical lubricating grooves and has its left end screw-threaded and fitted with a washer, castellated nut and keep pin.

Towards the rear, above the clamping screw hole, an inclined lug is formed and drilled to receive a screw and washer for retaining the levelling lever in position.

The *levelling lever*, of aluminium alloy, is formed tubular at the front to fit over the bracket spindle, whilst over the exterior of the tubular part passes the angle of sight drum lever. The outer surface of the tubular part is prepared with helical grooves for lubrication purposes.

An upper lug is provided and screw-threaded to receive the screw securing the lever to the inclined lug of the bracket, whilst the lower part on the left has riveted to it a stud on which revolves the angle of sight drum.

In front, it is screw-threaded for the axis screw of the angle of sight drum friction clamp and below the screw-threaded part is a small longitudinal recess for the friction clamp spring.

In the rear upper part of the lever is engraved an index arrow filled in with black wax for reading the angle of sight drum.

The *angle of sight drum*, of aluminium alloy, is centrally bored to pivot on the stud riveted to the levelling lever and is engraved on its periphery with angles of sight reading from 0 to + or - 10 degrees. Its left edge is knurled to facilitate easy turning and its left face is machined with a cam groove for operating the sight and another groove is cut for lightening purposes. In the cam groove works the upper stud of the angle of sight drum lever.

The *angle of sight drum friction clamp* is in the form of a plate of aluminium alloy with a radiused bearing surface to bear against the drum, whilst the other end is screw-threaded for a knurled-headed screw and pin; it is kept forced to the front by a spring fitting into a recess in the levelling lever. The clamp pivots on an axis screw fitting into the levelling lever and the friction adjustment is regulated by the knurled-headed screw.

The *angle of sight drum lever*, of aluminium alloy, is shaped at the front in the form of a boss which is bored to fit over the tubular part of the levelling lever between the legs of the body. It projects towards the rear in the form of an arm which has connected to it two studs.

The upper or right-hand stud fits into the angle of sight drum cam groove, whilst the left-hand stud forms the pivot for the range drum.

The rear upper part has an engraved index arrow for indicating the readings on the range drum. At the front is a small screw-threaded hole for the axis screw of the range drum clicker arm and an additional hole is provided for the axis screw in order that a larger pattern range drum and clicker arm may be fitted if necessary; also a small longitudinal recess is formed for the clicker arm spring.

The *body*, of aluminium alloy, is a circular-shaped plate with two vertical legs formed on its under side. Both legs

are bored to fit over the bracket spindle, where they are retained by a washer, castellated nut and keep pin.

The left leg is extended downwards and prepared to receive a stud which engages with the cam groove in the range drum.

The upper surface on the left side is shaped to receive a spirit bubble, whilst the upper centre part is suitably recessed for the worm spindle bearing of the deflection gear and the worm wheel of the dial, a central hole being prepared and screw-threaded for the axis screw of the worm wheel.

The upper part is extended towards the rear and its under side is prepared to receive an emergency level and a locking screw with register pin for securing the emergency level in position. The locking screw has a knurled head for gripping purposes.

The *range drum*, of aluminium alloy, rotates on a stud attached to the left side of the angle of sight drum lever.

Engraved on its periphery are readings from 0 to 28, representing 0 to 2,800 yards, each figure indicating hundreds of yards. The left edge of the drum is formed with knurled teeth for gripping and clicker operating purposes, whilst the left side is machined with a cam groove as well as a lightening groove. Engaging in the cam groove is the stud attached to the left leg of the body. (Larger pattern drums are engraved up to 4,000 yards range.)

The *range drum clicker arm*, of aluminium alloy, consists of an arm pivoting on an axis screw fitting into the angle of sight drum lever. The arm at the rear is prepared with knurled teeth to bear against the knurled teeth on the drum, whilst the forward end is forced and kept upward by a spring carried in a recess in the angle of sight drum lever.

*Note.*—When setting the range drum quickly to a large reading, disengage the clicker arm by depressing the front part by hand, otherwise the arm may damage the teeth on the range drum.

The *worm spindle bearing*, of duralumin, is a rectangular plate shaped at the rear to receive the deflection gear worm spindle.

The front face is knurled to prevent the fingers from slipping when the bearing is forced towards the rear. The centre part is prepared to receive the dial worm wheel and has an elongated hole to fit loosely over the axis screw of the worm wheel. In front of the elongated hole is a narrow slot into which is inserted an actuating spring. The actuating spring keeps the bearing forced towards the front, so ensuring that the teeth on the deflection gear worm spindle engage with the dial worm wheel.

The rear face of the bearing is slotted to receive a deflection gear clicker lever and prepared for the stud of the clicker lever.

On the upper surfaces at the front and rear are engraved index arrows for reading the dial settings.

The *deflection gear worm spindle*, of phosphor-bronze, is mounted in the above bearing. The right end is formed with a micrometer head, on the left side of which is carried a clicker ring held rigid to the head by a steadying pin.

The centre of the spindle is formed with worm threads to engage with the dial worm wheel, whilst the left end is square-shaped for the attachment of another micrometer head retained by a washer and nut. The left micrometer head has a bearing surface for the clicker lever when in the locked position.

The *deflection gear clicker lever* is a flat plate pivoting on an axis screw. It has serrated teeth on its right end to engage with those of the clicker ring secured to the right micrometer head of the worm spindle. The plate is bevelled at each end and engraved on its rear face with index arrows and the letters L and R respectively.

On its inner face is a central recess for a spring interposed between the lever and the worm spindle bearing, and towards the left side is a hole for a stud screwed and pinned to the worm spindle bearing. Over the outer screw-threaded part of the stud is fitted a spiral spring and a clamping nut with a retaining washer. The clamping nut forces the lever hard against the left micrometer head of the deflection gear, so locking the deflection gear when required.

The *dial worm wheel* is a circular-shaped plate provided with worm threads on its periphery. It is formed with a central boss bored to fit around a central bearing on the body. It is secured by a flanged axis screw fitting into the body, the axis screw being retained in position by a taper pin.

The head of the axis screw has two flats cut upon it to facilitate turning by means of a spanner. On the upper surface equidistant apart are three screw-threaded holes for the screws securing the dial to the worm wheel.

The *dial*, of aluminium alloy, has a coned surface engraved 180 degrees right and 180 degrees left in 10-degree readings.

The centre part is flanged and prepared with three elongated holes for the screws securing it to the worm wheel. The upper flanged part is cut away on each side for the carrier of the lensatic sight worm.

On top of the dial is positioned a clamping plate. The clamping plate is a flat steel washer with a central hole to receive the pivot bracket securing nut and three elongated holes are prepared for the screws securing the plate, dial and worm wheel together.

The *lensatic sight worm carrier* is a flat steel plate with its right edge knurled. It fits across the sight and into the dial between the dial and the lensatic sight pivot bracket worm wheel.

The left end is prepared with lugs which form bearings for the slow motion worm and the zero latch.

The centre part has an elongated hole to fit around the stem of the lensatic sight pivot bracket and a rectangular slot for an actuating spring. The forward edge has two semi-circular parts cut away to enable attention to be given to the screws securing the dial to the dial worm wheel.

The worm employed for operating the lensatic sight worm wheel is mounted on an axis pin and is operated by turning a knurled head at its rear end.

The *lensatic sight pivot bracket worm wheel* is a flat circular plate with worm threads on its periphery.

On the left side are upper lugs prepared with bearings for a zero latch and another lug at the front for the adjusting screws of the lensatic sight pivot bracket. In the centre is a circular hole to fit around the stem of the pivot bracket. In the rear is another hole to enable attention to be given to the screws securing dial, whilst in the rear of the front lug is a screw-threaded hole for the screw clamping the pivot bracket and worm wheel together.

The *zero latch*, of steel, is mounted on an axis pin carried in bearings on the left side of the lensatic sight worm wheel. It is formed in the shape of a finger grip and prepared to fit between the lugs on the lensatic sight worm carrier. Around the axis pin is fitted a spring which lifts the catch from the two lugs on the lensatic sight worm carrier when released.

*Note.*—When the zero latch is released the lensatic sight and the pivot bracket can be quickly revolved.

The *lensatic sight pivot bracket*, of steel, is in the form of a cradle for carrying the lensatic sight. At the front are holes for an axis screw which forms the horizontal pivot of the lensatic sight and holes for the pivot bracket adjusting screws. On the right side is an axis screw for the lever levelling lensatic sight, whilst near the rear is a screw securing the leaf spring, and in front of the screw is a hole to receive a clamping screw. The clamping screw locks the pivot bracket to the worm wheel after the front adjusting screws have been adjusted.

The upper surfaces of the sides are in the form of ramps for the operation of depressing the lensatic sight.

The lever levelling lensatic sight with handle fits over the axis screw on the right side and is capable of being moved to the front or rear, where it is locked by a detent spring.

The *carrier lensatic sight*, of steel, pivots at the front in the

pivot bracket. On its right side is secured a stop with a securing screw which enables the stop to be readily adjusted.

Longitudinally the carrier is fitted with a spring-loaded cursor screw which is manipulated by turning a knurled head, whilst over the threaded part of the screw is mounted a nut suitably shaped to ride up the ramps on the pivot bracket.

To the left rear end of the carrier is attached a clamping screw which is used for locking the cursor screw when required.

The *lensatic sight* consists of a brass tube soldered to a flat brass base with two countersunk screw holes for attachment to the carrier.

Mounted in the tube at its front end is a glass cap and immediately behind the cap is a steel or brass aperture disc with a triangular aperture, which is used in conjunction with an eye lens at the rear end of the tube for sighting purposes.

The *emergency level* consists of a T-headed housing, containing a bubble retained by a screwed plug. The bubble is also protected by a revolving brass protector knurled at the rear to facilitate turning.

When the housing is correctly positioned it is then secured by a locking screw with register pin to the body.

*Action, with machine gun axis horizontal.*—(i) On turning the angle of sight drum, the stud attached to the angle of sight drum lever moves in the cam groove of the angle of sight drum, so causing the body to be elevated or depressed according to the movement given to the drum.

If the angle of sight is one of depression, then the body is elevated, so that when the body bubble is brought level again by means of the elevating gear of the machine gun mounting the sight line is left depressed accordingly.

(ii) When the range drum is revolved the stud on the left leg of the body has movement imparted to it, so further depressing the body with bubble and altering the line of sight. When the bubble level is now brought central by means of the machine gun mounting elevating gear the combined angle of sight and elevation is placed on the gun.

(iii) To move the line of sight rapidly for line, push the worm spindle bearing towards the rear until the deflection worm is disengaged, then turn the dial until the line of sight is nearly on the aiming point, finally laying on the aiming point for line by means of the deflection gear.

(iv) To lay the lensatic sight on an aiming point for line without moving the dial, push the lensatic sight worm carrier towards the left until the zero latch is released and the worm disengages itself from the worm wheel, when the worm wheel, pivot bracket and lensatic sight can be roughly set for line; final laying being carried out by operating the lensatic sight worm.

The *Mk. II* M.G. dial sight is very similar to the *Mk. III* except that the lensatic sight and carrier are of the old pattern. The materials used are the same as for the *Mk. III*.

The *Mk. I* M.G. dial sight differs from the *Mk. II* in that most of the materials are of bronze in lieu of aluminium alloy.

If the *Mk. I* or *Mk. II* M.G. dial sights are fitted with the latest pattern lensatic sight a star is added to the Mark, viz. *Mk. I\**, etc.

### CARE AND PRESERVATION

The dial sight when issued is in correct adjustment with all components in good order.

It is very unlikely that the interior parts will require cleaning, and on no account should the dial sight be taken to pieces except by persons holding a certificate from the Military College of Science stating that they are qualified to do so.

Each dial sight should be kept with the machine gun to which it belongs, and on which it has been adjusted. If used with any other machine gun, adjustments may be required.

The metal parts of the dial sight must be cleaned with a soft cloth and a little oil, which must be rubbed off afterwards, taking care that the lens is not touched.

The exterior lens of the lensatic sight should be cleaned with a piece of linen cloth, which must be kept perfectly clean and dry, and used for this purpose only. Great care must be taken that no oil or grease is allowed to touch the lens.

All working parts should be well lubricated with clean oil.

The clicker adjustments should not be set to act too drastically, otherwise the clickers will become damaged or troublesome.

After the quick release devices have been operated, always make sure that the worm and worm wheel teeth are correctly engaging before attempting to move the gears by their slow motion worms.

The efficiency of the dial sight depends entirely upon the accuracy of the cam grooves. Special care must be taken that the cam surfaces on the drums receive no damage. The cam grooves and studs should be kept free from dust and grit by wiping with a clean rag moistened with a few drops of oil.

Immediately after the dial sight has been stripped it should be tested and adjusted on the machine gun with which it will be employed.

Spirit bubbles must not be interfered with except when damaged or broken. If a new bubble is necessary it must be set level and carefully fitted with reference to the line of sight.

When not in use the dial sight should be kept in its case.

### 76. Attachments, blank firing

The following special components are fitted to Mk. I, IVA and IVB .303-in. guns when used for firing blank ammunition.

Barrel, Mk. II, D.P.B. (Drill purposes, blank)

Cone, front, muzzle-attachment, blank

Cup, muzzle-attachment, blank, Mk. I

Nut, adjusting, muzzle-attachment, blank

Screw, adjusting, muzzle-attachment, blank

Spanner, muzzle-attachment, blank

Washer, muzzle-attachment, blank.

#### Description.

The *barrel*, specially choked at the breech, is marked "D.P.B." on the trunnion block. The service barrel in the gun must be replaced by the D.P.B. barrel when the gun is required for firing blank ammunition.

The *muzzle cup* has a large recessed seating to house the head of the adjusting screw and is assembled to the D.P.B. barrel in the usual manner.

The *adjusting screw* has a large concave head drilled longitudinally for approximately one inch and is screwed into the front cone so that the large end may enter the muzzle cup. (The original screws were drilled throughout, these have now been plugged at the foremost end.)

The *front cone* is recessed, with holes drilled on the periphery, and assembles into the outer casing of the muzzle-attachment in place of the ball pattern front cone.

The *adjusting nut* is of the ring type with holes in the outside edge to accommodate the spanner. It assembles to the projecting end of the adjusting screw and locks against the face of the front cone.

The *spanner* is of the "C" type suitably arranged for the muzzle cup, adjusting screw and nut.

The *muzzle-attachment washer* is for use with the Mk. IVA and IVB guns to prevent the unscrewing of the front cone when used in A.F.Vs. It is a thin steel washer with 3 tags (two long and one short) and assembles between the front cone and outer casing. The long tags are turned into the openings of the outer casing, the small tag being turned into a spanner slot of the front cone.

*Adjustment of the Mk. I, IVA and IVB guns when assembled with the special components.*

(a) The weight required to withdraw the recoiling portions of the gun to the rear, when tested with a spring balance applied to the boss of the crank handle, should not exceed 2 lb. (fusee spring removed).

The weight of the fusee spring, when tested by a pull on the crank handle, should be approximately  $4\frac{1}{2}$  lb.

(b) The adjusting screw of the muzzle-attachment should first be screwed toward the muzzle cup until it just commences to force the recoiling portions backward. It should then be unscrewed until only just sufficient power is obtained to function the gun with a load of  $4\frac{1}{2}$  lb. on the fusee spring. The screw should then be locked in position by the nut.

*Note.*—The screw should rarely require to be unscrewed less than  $2\frac{1}{2}$  turns and in no case less than one turn back from the muzzle cup.

The following special components are fitted to Mk. VI, VI\* and VII .303-in. guns when used for firing blank ammunition:—

Barrel, Mk. III, D.P.B.

Cup, muzzle-attachment, blank, Mk. II.

#### *Description.*

*Barrel.*—The overall length is .4-in. shorter than the service pattern and the chamber is specially choked at the breech similarly to the Mk. II, D.P.B. It is marked "Mk. III D.P.B." on the trunnion block.

The *muzzle cup* is designed to take the place of the front and rear cups in the Mk. V pattern muzzle-attachment. The front end is reduced to fit the bore of the Mk. IV outer casing and drilled approximately  $1\frac{1}{4}$ -in. for lightness. The rear end is the same diameter as the inside of the Mk. III gland and recessed the same diameter as the sleeve of the barrel. When fitted to the gun the cup prevents assembly of the service pattern barrel.

*Adjustment of the Mk. VI, VI\* and VII guns when assembled with the special components.*

The adjustments mentioned at (a) for the Mk. I, IVA and IVB guns will be carried out with the exception that no adjustment of the muzzle-attachment is necessary.

#### *General particulars.*

A 250-round belt, preferably part-worn as regards the size of pockets, should be employed. The blank ammunition should be inserted by hand, crimped end flush with the front end of the belt, in groups of 10 rounds each. This number is sufficient for the purpose of locating machine gun fire and also ensures a longer life of choke in the barrel, which in time becomes enlarged owing to the action of the hot powder gases.

When firing becomes noticeably irregular, the barrel should be set aside for special examination and gauging, either by the Assistant Inspector of Armourers or the C.I.S.A.'s. Examiners on tour, whichever is the most convenient.

The barrel casing must be filled with water as for ball ammunition.

The special components for blank firing will only be fitted when actually needed. On completion of blank firing the guns must immediately be restored to their normal conditions for firing ball ammunition.

The special components for blank firing may be used with "D.P." guns for instructional purposes but *service guns only will be used for firing.*

*Cleaning.*—The general cleaning of the gun after firing will be carried out as for ball ammunition, but for D.P.B. barrels it is unnecessary to clean the bore in advance of the bush, and also undesirable in view of the fact that the bush is driven in from the breech and is liable to be driven backward from its correct position by the application of a rod from the muzzle. The chamber must be kept clean.

### 77. Bag, water, M.G., Mk. I

The bag is supplied for use in filling the barrel casings of Vickers M.Gs. in A.F.Vs. It consists of a rubber bag enclosed in a canvas cover having, at the top, a canvas flap with a large brass eyelet. A right-angled brass nozzle, with a screwed plug secured to it by a length of M.G. chain and 2 M.G. "S" hooks, is screwed into the mouth of the bag. The capacity of the bag is approximately 6 pints.

### 78. Belts and boxes, belt

#### *Description.*

*Belts.*—Are made of webbing, the .303-in. belt holding 250 rounds and the .5-in. belt holding 100 rounds. The belts are made from two lengths of webbing held together by brass eyelets and strips; in the .5-in. belt the strips are of equal length whereas in the .303-in. belt the strips are of two lengths, the longer strip forming a guide to indicate the correct protrusion of cartridges in a filled belt. The belts are of increased thickness at the bullet edge, the webbing being folded over a piece of cord to ensure that the cartridges will lie evenly in the ammunition belt box, and are kept level when passing through the feed block of the gun.

A *short D.P. belt* holding 25 rounds, for use with .303-in. guns, can be made up locally by using the tangs and the good part of an unserviceable 250-round belt. These belts are only to be used with D.P. guns for setting up stoppages, etc.

*Boxes, belt.*—The No. 8 box for .303-in. Mk. I guns is of metal to hold one filled belt. The lid, which is in two parts, is hinged together in the centre so that only one part need be

open when the belt is in use. When closed, the lid as one unit is secured by quick-release straps.

The No. 10 box issued for use with .303-in. A.F.V. pattern guns differs from the No. 8 mainly in that the opening from which the belt is fed slopes downward and the lid hinges directly on the end of the box. Two spring clips retain the longest section of the lid in the closed position when the shorter section is open.

The No. 2 .5-in. box is used for .5-in. guns in A.F.Vs. and is similar to the No. 10 .303-in. box.

*Note.*—All boxes are stencilled with the appropriate nomenclature.

#### *Tests, adjustments and repairs*

*Belts.*—(a) Belts should be frequently examined; they should be kept free from dirt, moisture and oil, should not be torn, and the brass strips should not be bent or broken. New belts should be plugged, but care must be taken in the use of the belt plug or loose pockets will result.

(b) *To clean a dirty or greasy belt.*—Soak for two hours in a solution containing 1 part soda, 3 parts soft soap, and 10 parts water. It should then be scrubbed, hung up and, when dry, plugged.

(c) *To repair a torn belt.*—If the belt is badly torn, cut out the torn portion, sew the good ends together and cover with the brass strips. The cutting of the belt should be done in such a manner as to ensure that the repair to the top portion of the webbing does not coincide with the repair to the bottom portion.

*Boxes, belt.*—Must be frequently inspected. Filled belts cannot be withdrawn freely if the box is dented.

Any dirt in the interior must be removed and the exterior periodically wiped with a lightly oiled rag.

#### **79. Boxes, spares, M.G.**

Three boxes are provided for the carriage of spare parts for guns in A.F.Vs. The No. 1 box is for emergency spares for .303-in. guns; No. 2 for maintenance spares for .303-in. and .5-in. guns; and No. 3 for emergency spares for .5-in. guns. The fillings of the boxes will be found in the "Equipment Scales for 'A' Vehicles". The boxes are painted white and are stencilled with the appropriate nomenclature.

#### **80. Box, spare parts and tools, Vickers .303-in. M.G., Mk. II**

These boxes are of wood with a hinged lid which is secured by means of a spring catch. Two leather straps form the

carrying handles, one fitted to the front and the other to the rear of the box. The filling of the box to be as detailed in Equipment Regulations, Part I.

#### **81. Bracket, dial sight, M.G., Mk. I**

This bracket is designed for attachment to the left hand side of the Mk. I .303-in. Vickers machine gun and serves as a mounting for the dial sight.

It consists of the following parts:—

*Bracket.*—This bracket has a dovetail slot, to accommodate the dial sight, and holes which correspond with the joint pin and "T" fixing pin holes in the rear-crosspiece. An arm extends forward, the front end of which is slotted to engage behind the head of the cover joint pin.

*Pin, "T" fixing, rear-crosspiece, Mk. II;*

*Pin, joint, rear-crosspiece, Mk. III;*

*Pin, joint, cover, Mk. V.*—

These pins are similar to the corresponding components of the gun which they replace when the bracket is fitted, differing from the service stores only in that they are longer, in order to accommodate the bracket.

#### **82. Can, condenser, steam, with filler**

The condenser can is a standard two-gallon petrol can with a brass filler assembled over the opening of the can. The filler is designed to be inserted into the filling hole of the gun casing and is attached to the can by means of a chain and "S" hook. A clip is provided for its retention when not in use.

The cap of the can is secured against loss by a shackle consisting of a steel wire stirrup engaging the existing wire holes in the cap to which is attached a split pin and washer to form a swivel, and a length of brass chain, one end of which connects with the swivel and the other end to the "S" hook of the filler which is attached to an eye on the can below the cap.

#### **83. Case, spare barrel**

The case, spare barrel, Vickers .5-in. M.G., Mk. I, is a tubular leather case with a cap secured by a leather strap. The case, spare barrel, and cleaning rod .303-in. M.G., Mk. II is similar in design with the exception that it houses a cleaning rod in addition to a .303-in. barrel. The case is provided with two straps with buckles for securing it to the mounting hanger of the .303-in. M.G. packsaddlery.

#### 84. Case, spare parts and tools, Vickers .303-in. M.G., Mk. I\*\*

This case is of leather and contains the filled wallet and stores as enumerated in Equipment Regulations, Part I. It is provided with a lid secured by a buckle and strap. A shoulder strap for carrying purposes, 66-in. long, passes around the case through loops at the side. The lid and case are suitably strengthened by metal strips riveted to the leather.

*Note.*—The case, completely filled, should always accompany the gun when in action, as the contents are emergency spares.

#### 85. Cases, rule, slide

*Cases, rule, slide, M.G., Mk. III.*—No. 1 (leather) and No. 2 (web), for carriage of the Mk. III rule, are attached respectively to cavalry or infantry equipment.

*Case, rule, slide, M.G., Mk. II.*—For carriage of the Mk. I rule, is of webbing with a web shoulder strap.

#### 86. Chests for Vickers M.G.

The *Chests, Vickers or Lewis .303-in. M.G., Mk. III "B"* (and *III "A"*) for Mk. I .303-in. guns are of wood, the lid being hinged, and fastened with two hasps and turnbuckles. A rope handle is attached to each end by a cleat. The chock, which is provided for the muzzle end of the gun, is made reversible in order to meet the difference in size of the barrel casing of the Vickers gun and the radiator casing of the Lewis gun. A hinged fitting supporting the underside of the gun, is also arranged to accommodate the variations between the two patterns. A metal strip secures the canvas at the back.

The contents of the chest as arranged for a Vickers Mk. I gun is as follows:—

Gun .. .. .	1
Barrel (spare) .. .. .	1
Rod, cleaning, .303-in. M.G., Mk. II "A" .. .. .	1

The weight (empty) is approximately 38 lb.

The *Chest, Vickers .303-in. M.G., Mk. V*, is designed so that all patterns of A.F.V. .303-in. guns can be accommodated. This chest is similar in design to the Mk. III "B" Vickers and Lewis Chest but approximately  $\frac{1}{2}$ -in. wider and has appropriate fittings to take the gun required. The *Mk. IV Chest*, designed for the Mk. IVA, IVB or VI guns and modified to Mk. IV\* to take the Mk. IVA, IVB, VI or Mk. VI\* guns became obsolescent by the introduction of the Mk. V chest.

Three patterns of *Chest .5-in. Vickers M.G.* are provided. They are similar externally but have different internal fittings. The lid is fitted with twelve countersunk washers and is secured to the chest by iron flathead screws; rope handles are secured to the ends by cleats.

The *Mk. I* chest has internal fittings to take either the Mk. I or Mk. II .5-in. gun, the *Mk. I\** (now obsolescent) is a modified Mk. I chest to take the Mk. IV gun, whilst the *Mk. II* chest has redesigned fittings to accommodate the Mk. V gun.

All three chests are stencilled with the appropriate designation on the ends and sides.

#### Contents of chests

<i>Mk. I.</i> —	Gun, machine, Vickers, .5-in., Mk. I ..	1
	Flash, eliminator .. .. .	1
	Barrel (spare) .. .. .	1
	Rod, cleaning, Vickers .5-in. M.G., Mk. I .. .. .	1

or

	Gun, machine, Vickers, .5-in., Mk. II ..	1
	Shoulder-piece, M.G., No. 3 .. .. .	1
	Barrel (spare) .. .. .	1
	Rod, cleaning, Vickers .5-in. M.G., Mk. I .. .. .	1

*Mk. I\**.—Obsolescent.

<i>Mk. II.</i> —	Gun, machine, Vickers, .5-in., Mk. V (with "Guard, fusee, Vickers .5-in. M.G." and "Guard, crank handle, M.G., Mk. II" attached) .. .. .	1
	Barrel (spare) .. .. .	1
	Rod, cleaning, Vickers .5-in. and .303-in. M.Gs., Mk. II .. .. .	1
	Shoulder-piece, M.G., No. 6 .. .. .	1

#### 87. Clip, locking, outer casing, muzzle-attachment

The clip is in the form of a band and is suitably chamfered to allow assembly to the muzzle-attachment. A stud riveted to the inside of the clip replaces the normal split pin. This clip is for use with Mk. I .303-in. guns when used in A.F.V. mountings.

### 88. Deflector, cartridge case, Vickers .303-in. M.G., Mk. III

This deflector is used with Mk. I .303-in. guns when mounted in A.F.V.s, to collect the ejected cartridge cases. It consists of a steel rectangular frame with projecting strips at the front and rear for attachment to the gun and a canvas bag which has three openings, one on each side near the top to facilitate the clearing of stoppages, and one at the bottom for the removal of spent cases; all the openings are closed by patent "zip" fasteners. The bag, which is secured to the frame by rivets and washers, has an internal steel stiffening band.

### 89. Guards, crank handle, M.G.

Two patterns are provided. The object of the guard is to protect the tank commander against injury from the moving crank handle, and is used with A.F.V. guns mounted in No. 10 mountings, the Mk. I guard being for use with Mk. IVA, IIVB, VI, VI\* and VII .303-in. guns and the Mk. IV .5-in. gun, and the Mk. II for use with the Mk. V .5-in. gun only.

The guards, which are used only on the right hand gun in the mounting, are similar in design and consist of a gunmetal body and a shield for the crank handle. The body assembles to the rear-crosspiece in a similar manner to the shoulder-piece. The design of the shield allows it to rotate downward, thereby providing access to the crank handle when necessary.

### 90. Guard, fusee, Vickers .5-in. M.G.

This guard is provided for use with the Mk. II .5-in. gun when mounted in Lanchester armoured cars and is designed to protect the firer's face from the exposed fusee. The guard consists of an adapter and bracket, the latter having a sheet metal guard riveted to it. A cushioned leather pad is secured to the guard by means of two pins, the guard being secured to the resistance piece of the gun by a wing nut.

### 91. Guard, shoulder-piece, M.G., Mk. I

This guard is used in conjunction with the No. 2 or No. 3 shoulder-piece on Mk. IVA or IVB .303-in. guns when mounted in No. 6 mountings. The guard is designed to protect the face of the firer from injury by the moving crank handle. It consists of a metal plate bent at right angles at the top and hinged at the rear end to a boss on the shoulder-piece. A spring-loaded plunger bearing on the hinge holds the guard in position.

### 92. Lamps, aiming, M.G.

There are two patterns of aiming lamp in existence, the Mk. II (obsolescent) and the Mk. III which is the present service pattern. Both patterns are housed in wooden boxes which are stencilled with the appropriate designation.

The Mk. II aiming lamp consists of two lamps which are suitably housed in the box and connected to the batteries. A switch is provided which can be operated to illuminate either lamp separately or both lamps together, with an adjustable resistance to regulate the amount of light shown by the lamps. When in use the two lamps are fitted to the aiming posts, a length of cable housed on a drum in the lid of the box allowing electrical contact to be maintained when the box is positioned some distance from the post. The cable is wound by means of a folding handle on the side of the box.

The Mk. III aiming lamp has a hinged ground spike which folds against the box and is retained by a leather strap. The lamp is a proprietary electric cycle lamp, an amber celluloid disc being supplied to diffuse the light when necessary. Unlike the Mk. II, the box is left with the aiming post when in use, the lamp being operated by means of a 30 yards length of plaited fishing line. The line is connected to a switch rod which operates a ceiling type switch in the box which, in turn, is connected by flexible leads to the battery and lamp. A steel chain 30-in. long has one end secured to an eye in the box, the other end having a spring hook. The chain can be used for anchoring the box to any convenient post or object if the nature of the ground does not permit of the use of the ground spike.

### 93. Machine, positioning, cartridges, Vickers .5-in., Mk. I

This machine is supplied for positioning the cartridges in the .5-in. belt. Two lugs, which are grooved to allow a passage for the cartridges, are provided to form a guide for the belt. A plunger, operated by a lever, positions the base of the cartridge. Four holes are provided in the base to secure it to a bench or other suitable object by means of wood screws.

### 94. Pads, cheek, M.G.

There are two patterns of cheek pad—the No. 2 is used on Mk. IVA and IVB .303-in. guns, and consists of two leather pads stuffed with horsehair and joined together by means of five snap fasteners. Two steel clips are arranged to engage with the loops on the rear cover of the gun, the bottom of the

pad being secured by a quick-release fastener which engages on a loop on the left side of the bottom plate of the gun.

The No. 3 is used on Mk. VI, VI\* and VII .303-in. guns and is similar in design to the No. 2 except that for attachment to the gun, a loop replaces the two clips and a leather strap is provided in lieu of the quick-release fastener. The loop engages on a stud on the rear cover of the gun and the leather strap on a stud on the underside of the fusee spring box.

#### 95. Pad, rear-crosspiece, M.G., No. 1

This pad is for Mk. IVA and IVB .303-in. Vickers machine guns when mounted in No. 5 mountings and is used when a shoulder-piece is not required. It consists of a gunmetal body with flanges to engage the rear-crosspiece of the gun and is retained by a spring-loaded catch. A sponge rubber pad is secured to the rear of the body by a leather cover and eight screws.

#### 96. Plug, belt, M.G., Mk. I

This plug is provided for opening out the pockets of .303-in. belts when they become tight.

#### 97. Plugs, clearing, M.G.

There are three patterns of M.G. clearing plug for extracting separated cartridge cases from the barrel chamber.

*Plug, clearing, Vickers .303-in. M.G., Mk. I.*—Now obsolescent, has a split stem, screwed at the end and bored longitudinally, with a slotted head drilled laterally for assembly of the handle axis pin. The handle, approximately 5-in. long, has a flat projection which seats on the front of the stem head. A tapered plunger approximately  $3\frac{1}{2}$ -in. long, with an enlarged head, is housed in the bore of the stem and retained by a lateral pin allowing  $\frac{1}{2}$ -in. traverse to the plunger. For distinguishing purposes it is marked "Plug, clearing, gun, Vickers, .303-in." on the side of the handle.

*To use the plug.*—Hang the breech lock and insert the stem of the plug into the chamber of the barrel. Hold the plug handle vertically and rotate the crank handle backward and forward, lightly tapping the head of the plunger with the face of the extractor. Hang the lock and push forward on the plug handle until the separated case is extracted.

*Plug, clearing, Vickers .5-in. M.G., Mk. I.*—Is similar to the .303-in. pattern, but correspondingly larger to suit the .5-in. barrel. It is marked "Plug, clearing, .50-inch, G.V." on the handle.

*Plug, clearing, .303-in. M.G., Mk. I.*—Is for use with all .303-in. machine guns and consists of three components, i.e. stem, head and plunger.

The *stem* is tubular, having three longitudinal slots to allow the front ends, on which annular grooves are formed, to be expanded, for gripping the separated cartridge case in the chamber.

The *head* is tapered, having a rim at the large end recessed approximately  $\frac{3}{8}$ -in. to house the plain end of the stem, and is drilled and tapped centrally for assembly of the plunger.

The *plunger*, approximately  $2\frac{1}{2}$ -in. long, passes through the stem and assembles to the head, the enlarged front end being tapered to provide the means for expanding the stem when the plunger is withdrawn.

*To assemble the plug.*—Slide the split end of the stem over the screwed end of the plunger. Hold the enlarged end of the plunger and assemble the head, recessed end foremost, and tighten by hand.

*To strip the plug.*—Reverse the order of assembling.

*To use the plug.*—When using the plug with Vickers machine guns slide the rimmed head on the extractor until positioned on the gib face. Allow the lock to travel fully forward, thus forcing the stem into the separated case. Rotate the crank handle and withdraw the lock to the rear thereby drawing the tapered end of the plunger into the stem and tending to expand the annular rings into the case, and withdraw the plug, with the separated case, from the chamber.

Remove the plug from the face of the extractor, unscrew the head and remove the plunger. The separated case can now be removed from the end of the stem.

#### 98. Posts, aiming, M.G.

There are three patterns of aiming post in existence, the Mk. I and III being used in conjunction with the aiming lamps.

The *Mk. I* (now obsolescent) is used with the Mk. II aiming lamp (also obsolescent) and consists of a telescopic stem which has at the bottom, a base plate with three ground spikes. The top portion of the stem slides in the lower portion and can be adjusted and secured at any convenient height. For day firing, a "U" bracket, having a disc fitted with a bullseye, is provided at the top of the stem, whilst for night firing the lamp is assembled to the bracket. A canvas cover, retained by a leather lace, is provided to cover the disc when the lamp is in use.

The *Mk. II* is used only by cavalry for day firing and consists of a stem constructed from two rectangular steel bars. The lower bar is pointed at the bottom to act as a ground spike, and has a stud at the top, whilst the upper bar is slotted to fit over the stud and clamped by means of a wing nut screwed on to the stud. It is fitted at the top with a white disc having a blank central disc 1-in. in diameter. The post can be folded in two for carrying purposes. No provision is made on this post for a lamp. The approximate weight is 8 ozs.

The *Mk. III* is designed for use with the *Mk. III* lamp; it has a triangular base with three ground spikes. The stem consists of two rectangular steel bars which are hinged by means of a stud and wing nut; a white aiming disc is riveted to the upper bar. A bracket riveted to the bottom of the bar allows the post to be used with the aiming disc in a lower position, this being possible by rotating the upper bar until it is at right angles with the lower bar and laying the post on its side, the bracket acting as a foot in conjunction with the side of the triangular base. The lamp is fitted at the extreme top of the post, and can be used with the post in the high or low positions. For storage the stem of the post is folded, a projecting bracket riveted on to the bottom of the stem protecting the aiming disc from damage during transit.

### 99. Post, zero, M.G., Mk. I

This post is provided for use in conjunction with machine guns employed for indirect fire. It consists of an iron rod  $\frac{1}{2}$ -in. in diameter, bent at one end to form an aiming ring of 4-in. internal diameter and pointed at the other for insertion into the ground. The post, which is painted service colour, is about 38 $\frac{1}{2}$ -in. overall length.

### 100. Rules, slide, M.G.

Slide rules are provided for the calculation of safety angles, etc., of machine gun fire.

Details for use are given in *Small Arms Training*, Vol. III, Chapter X, Sec. 67.

*Rule, slide, M.G., Mk. III.*—Is of boxwood, approximately 6-in. long by 3-in. wide, with 2 slides. A cord 24-in. long, having a bead at the free end, is attached to the rule for purposes of gratulation.

*Rule, slide, M.G., Mk. I.*—Is ivory-faced, approximately 11-in. long by 2-in. wide. This has now been superseded by the *Mk. III* pattern.

(*Note.*—The *Mk. II* rule, made of duralumin and similar in design to the *Mk. III* pattern, is special to the requirements of India.)

### 101. Shoulder-pieces, M.G.

Several shoulder-pieces are provided for use with A.F.V. pattern guns and in addition to the use that the name implies are used for balancing the various mountings when the guns are mounted. The shoulder-pieces are all designed to assemble to the rear-crosspiece of any A.F.V. pattern Vickers gun and with the exception of the No. 4 and No. 6, which are of light alloy, have gunmetal bodies. They are shaped to fit the shoulder, a sponge rubber pad being secured on the rear by means of a leather cover and provided with a spring-loaded catch for retention to the gun.

The No. 3, having two cavities into which counterweights can be inserted and secured by screws, is used on certain mountings to obtain balance. A table of the shoulder-pieces with their appropriate uses is given below.—

<i>Shoulder-piece</i>	<i>A.F.V. Vickers guns</i>	<i>Mountings</i>
No. 3	Mks. IVA and IVB ·303-in.	Nos. 6, 7 and 8
No. 3	Mks. VI, VI* and VII ·303-in.	No. 10
No. 3	Mk. II ·5-in.	No. 6
No. 4	All †	—
No. 5 (obsolescent)	Mk. IV ·5-in.	Nos. 8 and 9
No. 6	Mk. V ·5-in.	Nos. 8 and 9

### 102. Tools, belt, repairing, Vickers M.G., Mk. I

Are issued for the repair of ·303-in. and ·5-in. belts and should be used as instructed below.

Remove the damaged strips and eyelets.

If a long strip requires fitting, first join the two faces of the strip by placing an eyelet in the hole of the dished end and inserting the punch of the tool into the unopened end of the eyelet, the opened end to rest upon the die, and gently press the handles together. Reverse the punch and repeat the operation. Keep the strip horizontal, and with the punch of the tool as the centre, move the handles of the tool backward and forward in a circular direction until the head of the eyelet is correctly shaped.

Put the strips into position on the belt, insert the eyelets, and repeat the above operation.

† Used in conjunction with "Mounts, field, Vickers ·303-in. M.G., Mk. I". See Pamphlet No. 2, page 14, for description and use.

Short strips are fitted in a similar manner except that they do not require to be joined at one end before being placed on the belt.

Care must be taken to press the eyelets as far through the strips as possible before using the tool.

### 103. Tubings, condenser, steam

Five patterns of condenser steam tubing are provided for use with Vickers .303-in. guns.

A brief description of each is given hereunder.

*Tubing, condenser, steam, Vickers .303-in. M.G., Mk. I "B".*—Now obsolescent, consists of a 6-ft. length of flexible metallic tubing, to one end of which is soldered a brass elbow joint with a quick-release cap and spring for connection to the adapter on the condenser boss of the gun. The adapter is permanently fitted and when the quick-release cap is connected the elbow joint is pressed, by the spring in the cap, into engagement with the steam outlet in the gun.

*Tubing, condenser, steam, Vickers .303-in. M.G., Mk. III.*—Differs from the Mk. I "B" pattern only in that the flexible tubing is replaced with steam quality rubber hose, being connected to the elbow joint by means of a notched brass spigot fixed in the socket originally provided for the reception of the flexible tubing. The rubber hose is secured by copper wire binding.

The assembling of the two above-mentioned patterns of tubing to the gun is carried out as follows.

Apply the projections of the quick-release cap into the grooves of the adapter, pressing the cap inward, until the projections are free to rotate around the inner shoulder of the adapter collar, when, by reaction of the spring, they will automatically engage the locking recesses in the collar, located at 90 degrees to the grooves. Insert the free length of the tubing into the steam condenser can (see cans, condenser, steam) which should be about two-thirds full of water.

*Note.*—In order to avoid injury, the tubing should be disconnected from the gun when not required for use and, when possible, during transit.

*Tubing, condenser, steam, Vickers .303-in. M.G., Mk. II.*—Patterns "A", "B" and "C" differ only in the length of rubber hose, being 13-in., 24-in., and 16-in., respectively. The rubber hose (steam quality) is fitted with a Mk. II quick-release brass elbow joint, winged union nut and ferrule. The elbow joint has a notched spigot for attachment of the rubber hose and a spring-operated catch which engages a groove in the

underside of the gun condenser boss. Attached to the opposite end, by a notched spigot, is the brass ferrule having a flange encircling the coned head which retains the union nut to the tubing. The brass union nut assembles to a roof fitting in the A.F.V.

### 104. Wallet, Vickers .303-in. M.G., Mk. I

This wallet is of leather and when opened out measures 11½-in. by 8¼-in. It is provided with a double pocket, and when folded is secured by a buckle and strap. It is carried in the spare parts case.

The contents of the wallet are enumerated in Equipment Regulations, Part I.

### 105. Instructional stores

*Apparatus, weapon training, spotlight, Mk. II.*—This apparatus is designed for aiming instruction and comprises a spotlight projector, which can be operated either by the instructor or gunner, and a simulator to represent machine gun fire.

The *spot light projector*, which is identical with that used with the rifle, is mounted on a steel adjusting rod connected to the gun by a clamping bracket and projector sight.

The *clamping bracket* fits round the M.G. foresight bracket.

The *projector sight* which consists of a modified Lewis M.G. tangent sight leaf, fitted to a slotted bracket having a traversing screw, is mounted on the M.G. barrel casing by a hinged band. The leaf and bracket are graduated for elevation and direction in hundreds of yards and degrees respectively, so providing the means for sighting the projector.

The *M.G. sound simulator* consists of a hardwood box containing an electric bell action and a wooden sound box. Terminals are fitted to the side of the box for attaching the connector.

The *switch* consists of a fibre base with contact strips and two steel brackets with clamping screws for securing to the lower arms of the M.G. rear-crosspiece. Operation of the M.G. firing lever closes the switch so bringing the sound simulator and spotlight into action.

The *Mk. II connector* provides the means of connecting the spotlight projector, switch, M.G. sound simulator and transformer, and has a pear-shaped bell push which is incorporated for use of the instructor.

*Guns, machine, Vickers .303-in., Mk. I, D.P.*—Assembled from unserviceable guns or components and marked "D.P."

on the top of the trunnion block. Where possible, components are also marked "D.P." These guns are suitable only for instructional purposes, including stripping and assembling, *and under no circumstances may they be used for firing ball or blank ammunition.*

*Guns, machine, Vickers .303-in., Mk. I, skeleton.*—Provided from unserviceable guns or components, the components being sectioned to enable the action of the mechanism to be clearly seen and demonstrated.

*Locks, breech, Mk. I, D.P.*—Assembled from unserviceable components and are electro-coppered for distinguishing purposes.

*Locks, breech, Mk. II, D.P.*—Are similar to the Mk. I pattern, differing only in that they are fitted with Mk. II D.P. extractors for instructional use on A.F.V. pattern .303-in. guns.

As a safety precaution in both patterns of locks the point of the firing pin is reduced so that it does not protrude beyond the face of the extractor.

"D.P." barrels may be used only in service guns for firing single shots of blank ammunition.

*Tubing, condenser, steam, Mk. III, dummy* consists of a 6-ft. length of rope, one end being fitted with a wire hook to provide means of assembling the dummy tubing to the plug chain on Mk. I pattern guns.

## APPENDIX I

## LIST OF PLATES

## PLATE

GUN, MACHINE, VICKERS, .303-IN., MK. I—

- I. Right side elevation and plan of rear cover.
- II. Plan (covers removed).
- III. Longitudinal section.
- IV. Recoiling portions of the gun.
- V. Working positions of the lock.
- VI. Details of the lock.
- VII. Details of the covers, etc.
- VIII. Block, feed, right hand.

- IX. } Inserted as Plates I, II and III in Pamphlet
- X. } No. 2. Mounting, tripod, Vickers .303-in. M.G.,
- XI. } Mk. IV "B".

GUN, MACHINE, VICKERS, .303-IN., MK. VII—

- XII. Right side elevation.
- XIII. Plan (covers removed).
- XIV. Longitudinal and cross sections.
- XV. Details of covers and extractors.
- XVI. Blocks feed left hand.
- XVII. Details of trigger guard and ejection tube.
- XVIII. Details of muzzle-attachment, fusee spring box, etc.

- XIX. Inserted as Plate IV in Pamphlet No. 2. Mount, field, Vickers .303-in. M.G., Mk. I and Shoulder-piece, M.G., No. 4.

GUN, MACHINE, VICKERS, .5-IN., MK. V—

- XX. Right side elevation.
- XXI. Plan (covers removed).
- XXII. Longitudinal section.
- XXIII. Details of carrier trigger guard, trigger guard, and ejection tube.
- XXIV. Details of lock.
- XXV. Details of front and rear covers: layshafts; and trip gear.
- XXVI. Details of fusee spring and steam tube.
- XXVII. Blocks, feed, L.H.
- XXVIII. Blocks, feed, R.H.

LIST OF PLATES—*continued*

- PLATE  
 XXIX. Lamp, aiming, M.G., Mk. III.  
 XXX. Apparatus, weapon training, spotlight, Mk. II.  
 XXXI. } Director, No. 9, Mk. I and Stand, instruments,  
 XXXII. } No. 28, Mk. I.  
 XXXIII. }  
 XXXIV. Plotter, M.G., No. 1, Mk. I.  
 XXXV. Clinometer, Vickers .303-in. M.G., Mk. II.  
 XXXVI. } Sight, dial, M.G., Mk. III.  
 XXXVII. }

## APPENDIX II

LIST OF PARTS—KEY TO PLATES I to VIII  
and XII to XVIII

## .303-IN. VICKERS MACHINE GUNS

The same numbers are used for the parts to which they refer in all the plates. For full designation of issuable components, see V.A.O.S.

Part No.	Designation	Part No.	Designation
1	Casing, barrel.	29	Adapter, condenser.
2	Cap, end.	30	Head, milled.
3	Block, trunnion.	31	Stem, tangent sight.
4	Plate, outside, breech casing, left hand.	32	Lever, trigger.
5	Plate, outside, breech casing, right hand.	33	Nut, lever, trigger.
6	Plate, bottom, breech casing.	34	Spring, trigger lever.
7	Base, mounting.	35	Pin, split, nut, trigger lever.
8	Front barrel bearing, with muzzle guide.	36	Spring, front cover catch.
9	Cams.	37	Pin, joint, covers.
10	Bracket, check lever.	38	Cover, rear.
11	Stop, elevating.	39	Bar, trigger.
12	Union, outlet.	40	Lock, cover, rear.
13	Bracket, foresight.	41	Catch, rear cover.
14	Sight, fore.	42	Ramps, rear cover.
15	Tube, steam.	43	Spring, rear cover lock.
16	Plug, screwed.	44	Spring, rear cover catch.
17	Gland, muzzle-attachment.	45	Spring, trigger bar.
18	Casing, outer, muzzle-attachment.	46	Sight, tangent.
19	Cup, muzzle-attachment, ball.	47	Slide, tangent sight.
20	Cup, muzzle-attachment, front.	48	Spring, tangent sight.
21	Cup, muzzle-attachment, rear.	49	Piston, tangent sight.
22	Cone, front, muzzle-attachment, ball.	50	Finger-piece, rear cover catch.
23	Disc, muzzle-attachment, ball.	51	Screw, finger-piece, rear cover catch.
24	Screw, foresight.	52	Nut, spindle, tangent sight.
25	Spring, foresight.	53	Pin, nut, tangent sight spindle.
26	Pin, split, keeper, foresight screw.	54	Pin, split, rear cover hinge pins.
27	Cover, front.	55	Screw, graduated plate, upper.
28	Catch, front cover.	56	Screw, graduated plate, lower.
		57	Plate, graduated.
		58	Body, slide, tangent sight, Mk. III.
		59	Pinion, tangent sight.

Part No.	Designation	Part No.	Designation
60	Cover, pinion, tangent sight.	105	Pin, trigger, lock.
61	Spring, pinion, tangent sight.	106	Extractor.
62	Screw, locking, cover, pinion, tangent sight.	107	Gib.
63	Cap, press, tangent sight.	108	Spring, gib.
64	Screw, cap, press, tangent sight.	109	Cover, gib spring.
65	Washer, spring, cap, press, tangent sight.	110	Detent, extractor.
66	Rear-crosspiece.	111	Spring, detent, extractor.
67	Grip, rear-crosspiece.	112	Pin, detent, extractor.
68	Lever, firing.	113	Lever, extractor, left.
69	Pawl, firing lever.	114	Lever, extractor, right.
70	Pin, axis, firing lever.	115	Levers, side.
71	Spring, safety catch (with piston).	116	Bush, axis, side levers (common to 150).
72	Pin, safety catch.	117	Pin, split, bush, axis, side levers (common to 151).
73	Catch, safety.	118	Spring, lock.
74	Lever, trigger bar.	119	Thumb-piece, safety catch (common to 255).
75	Pin, joint, rear-crosspiece.	120	Block, feed.
76	Pin, "T", fixing, rear-cross-piece.	121	Lever, bottom, feed blocks.
77	Barrel.	122	Pin, split, levers, feed block.
78	Plate, side, left.	123	Slide, feed block.
79	Plate, side, right.	124	Pawls, top, feed block (front and rear).
80	Crank.	125	Springs, top pawl, feed block.
81	Rod, connecting.	126	Levers, top, R.H. feed block.
82	Handle, crank.	127	Pawls, bottom, R.H. feed block.
83	Pin, fixing, crank handle.	128	Spring, bottom pawls, R.H. feed block.
84	Fusee.	129	Pin, axis, bottom pawls, R.H. feed block.
85	Chain, fusee.	130	Lever, slide, L.H. feed block.
86	Spring, fusee.	131	Lever, cam, L.H. feed block.
87	Box, fusee spring.	132	Pawls, retaining, L.H. feed block.
88	Layshaft.	133	Spring, pawls retaining, L.H. feed block.
89	Screw, retaining, layshaft (common to 241 and 307).	134	Pin, axis, pawls, retaining, L.H. feed block.
90	Detent, safety stop.	135	Plug, cork.
91	Spring, plunger, safety stop.	136	Slides, No. 1.
92	Plunger, safety stop.	137	Tube, ejection.
93	Cap, safety stop.	138	Check, ejection tube.
94	Screw, adjusting, fusee spring.	139	Roller.
95	Nut, fusee, spring adjusting screw (with pin).	140	Collar, roller.
96	Sleeve, adjusting, fusee spring.	141	Lever, check.
97	Pin, hinge, rear cover.	142	Shutter.
98	Casing, lock.	143	Pin, check, ejection tube.
99	Sear.	144	Cap, union.
100	Spring, sear (common to 275).	145	Ring, joint.
101	Pin, firing.	146	Body, guard trigger.
102	Tumbler.	147	Side-piece, pistol grip, left, (common to 252).
103	Pin, tumbler.		
104	Trigger, lock.		

Part No.	Designation	Part No.	Designation
148	Side-piece, pistol grip, right (common to 251).	161	Screw, retaining, lever, layshaft.
149	Screw, side-pieces, pistol grip (common to 253).	162	Trigger, finger.
150	Bush, axis, trigger guard (common to 116).	163	Catch, trigger.
151	Pin, split, bush, axis, trigger guard (common to 117).	164	Pin, axis, trigger catch.
152	Spindle, loading catch.	165	Spring, trigger catch.
153	Spring, loading catch (common to 245).	166	Spring, safety catch (common to 256).
154	Sleeve, loading catch (common to 243).	167	Catch, trigger guard.
155	Screw, sleeve, loading catch.	168	Spring, trigger guard catch (with guide) (common to 238).
156	Lever, loading catch (common to 246).	169	Thumb-piece, trigger guard catch.
157	Screw, lever, loading catch (common to 247).	170	Spring, finger trigger (with guide).
158	Chain, loading catch (common to 249).	171	{ Pin, spring, catch trigger guard. Pin, spring, trigger finger.
159	Plunger, safety catch (common to 254).	172	{ Screw, trigger guard catch. Screw, safety catch (common to 257).
160	Lever, layshaft.		

## APPENDIX III

## LIST OF PARTS—KEY TO PLATES XX TO XLXVIII

## ·5-IN. VICKERS MACHINE GUNS

The same numbers are used for the parts to which they refer in all the plates. For full designation of issuable components, see V.A.O.S.

Part No.	Designation	Part No.	Designation
201	Casing, barrel.	235	Body, trigger guard carrier.
202	Cap, end.	236	Catch, trigger guard carrier.
203	Block, trunnion.	237	Screw, trigger guard carrier catch.
204	Plate, outside, breech casing, left hand.	238	Spring, trigger guard carrier catch (with guide) (common to 168).
205	Plate, outside, breech casing, right hand.	239	Pin, catch, trigger guard carrier.
206	Plate, bottom, breech casing.	240	Lever, layshaft, No. 4.
207	Base, mounting.	241	Screw, retaining, No. 4 layshaft lever (common to 89 and 307).
208	Front barrel bearing, with muzzle guide.	242	Spindle, loading catch.
209	Cams.	243	Sleeve, loading catch (common to 154).
210	Bracket, check lever.	244	Screw, sleeve, loading catch.
211	Gland, packing.	245	Spring, loading catch (common to 153).
212	Pin, joint, front cover.	246	Lever, loading catch (common to 156).
213	Pin, hinge, rear cover.	247	Screw, lever, loading catch (common to 157).
214	Rear-crosspiece.	248	Thumb-piece, trigger guard carrier.
215	Pin, joint, rear-crosspiece.	249	Chain, loading catch (common to 158).
216	Pin, "T", fixing, rear-crosspiece.	250	Body, trigger guard.
217	Barrel.	251	Side-piece, pistol grip, right (common to 148).
218	Plate, side, left.	252	Side-piece, pistol grip, left (common to 147).
219	Plate, side, right.	253	Screw, side-pieces, pistol grip (common to 149).
220	Crank.	254	Plunger, safety catch (common to 159).
221	Rod, connecting.	255	Thumb-piece, safety catch (common to 119).
222	Handle, crank.	256	Spring, safety catch (common to 166).
223	Pin, fixing, crank handle (common to 351).		
224	Resistance-piece.		
225	Roller, resistance-piece.		
226	Collar, resistance-piece roller.		
227	Lever, check.		
228	Ring, joint.		
229	Plug, screwed.		
230	Screw, keeper, steam tube.		
231	Lock, gland, packing.		
232	Screw, lock, packing gland.		
233	Screw, fixing, trigger guard.		
234	Plate, cover, mounting base.		

Part No.	Designation	Part No.	Designation
257	Screw, safety catch (common to 172).	299	Body, front cover.
258	Tube, ejection.	300	Spring, front cover extractor stop.
259	Plunger, ejection tube.	301	Pin, retaining, front cover catch.
260	Spring, plunger, ejection tube.	302	Pin, split, front cover catch retaining pin.
261	Pin, plunger, ejection tube.	303	Catch, front cover.
262	Pin, split, bush, axis, trigger guard carrier (common to 289 and 339).	304	Spring, front cover catch.
263	Bush, axis, trigger guard carrier (common to 290).	305	Layshaft.
264	Trigger, finger.	306	Lever, trigger bar.
265	Roller, finger trigger.	307	Screw, retaining, layshaft (common to 89 and 241).
266	Pin, axis, roller, finger trigger, rear.	308	Plunger, trip gear.
267	Pin, axis, roller, finger trigger, front.	309	Pin, retaining, spring trip gear.
268	Spring, finger trigger (with rod).	310	Spring, plunger, trip gear.
269	Casing, lock.	311	Spring, layshaft.
270	Levers, side.	312	Cap, trip gear.
271	Pin, firing.	313	Screw, cap, trip gear.
272	Tumbler.	314	Lever, trip gear.
273	Extractor.	315	Plunger, safety stop.
274	Trigger, lock.	316	Cap, safety stop.
275	Spring, sear (common to 100).	317	Spring, plunger, safety stop.
276	Spring, lock.	318	Pin, split, cap, safety stop (2 off).
277	Lever, extractor, right.	319	Nut, fusee spring tube.
278	Detent, extractor.	320	Pin, split, nut, fusee spring tube.
279	Spring, detent, extractor.	321	Tube, fusee spring.
280	Plunger, detent, extractor.	322	Bracket, fusee spring.
281	Plate, detent, extractor.	323	Spring, fusee.
282	Pin, trigger lock.	324	Screw, adjusting, fusee spring.
283	Pin, tumbler.	325	Rod, fusee spring.
284	Cover, gib spring.	326	Fusee, with chain.
285	Spring, gib.	327	Acorn, steam tube.
286	Gib.	328	Head, screwed, steam tube.
287	Sear (with spring).	329	Slide, valve, steam tube.
288	Pin, axis, sear.	330	Body, steam valve.
289	Pin, split, bush, axis, side levers (common to 262 and 339).	331	Spring, steam valve.
290	Bush, axis, side levers (common to 263).	332	Seating, steam valve spring.
291	Ramp, rear cover.	333	Ball, steam valve.
292	Body, rear cover.	334	Baffle, steam valve.
293	Catch, rear cover.	335	Block, feed, R. H.
294	Pin, retaining, rear cover catch.	336	Body, R. H. feed block.
295	Bar, trigger.	337	Body, L. H. feed block.
296	Spring, rear cover catch.	338	Lever, bottom, feed blocks.
297	Spring, trigger bar, long.	339	Pin, split, levers, feed blocks (common to 262 and 289).
298	Pin, split, trigger bar, No. 2	340	Slide, L. H. feed block.
		341	Slide, R. H. feed block.
		342	Pawls, top, L. H. feed block.
		343	Pawls, top, R. H. feed block.
		344	Springs, top pawls, feed block.

Part No.	Designation	Part No.	Designation
345	Levers, top, L.H. feed block.	351	Pin, axis, pawls, retaining feed blocks (common to 223).
346	Levers, top, R.H. feed block.	352	Pin, axis, top pawls, feed blocks.
347	Pawls, retaining, L.H. feed block.	353	Springs, bullet guide.
348	Pawls, retaining, R.H. feed block.	354	Springs, retaining cartridge, L.H. feed block.
349	Spring, pawls, retaining, L.H. feed block.	355	Springs, retaining cartridge, R.H. feed block.
350	Spring, pawls, retaining, R.H. feed block.		

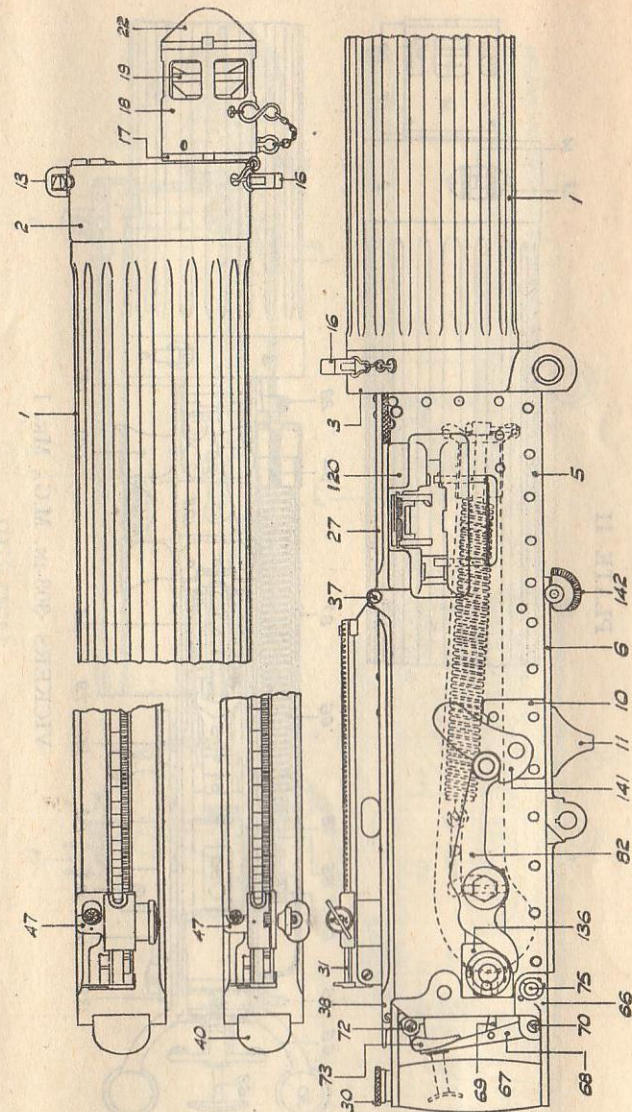
# APPENDIX IV STOWAGE DIMENSIONS, ETC.

	Length overall, inches	Depth, inches	Width, inches
Box, spares, M.G.			
No. 1 .. .. .	10 $\frac{1}{2}$	6 $\frac{3}{16}$	3 $\frac{1}{2}$
No. 2 .. .. .	7	2	6
No. 3 .. .. .	10 $\frac{9}{16}$	6 $\frac{5}{16}$	3 $\frac{3}{16}$
Box, spare parts and tools, Vickers			
·303-in. M.G., Mk. II ..	15 $\frac{11}{32}$	8	9 $\frac{1}{2}$
Case, spare parts and tools, Vickers			
·303-in. M.G., Mk. I**—			
8-in. × 5-in. × 4-in.			
Chests, Vickers or Lewis ·303-in.			
M.G. .. .. .	55 $\frac{1}{2}$	11 $\frac{7}{8}$	10 $\frac{1}{4}$
Chests, Vickers ·303-in. M.G.,			
Mk. V .. .. .	47 $\frac{3}{8}$	10 $\frac{5}{8}$	9 $\frac{1}{2}$
Lamp, aiming (in box)—			
Mk. II—12-in. × 8 $\frac{1}{2}$ -in. × 8 $\frac{9}{16}$ -in.			
Mk. III—9 $\frac{1}{2}$ -in. × 9-in. × 6-in.			

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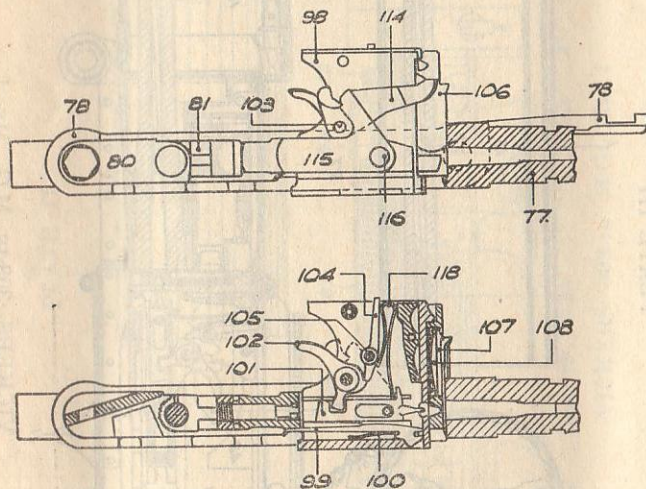
PLATE I



VICKERS 303-IN. M.G., Mk. I

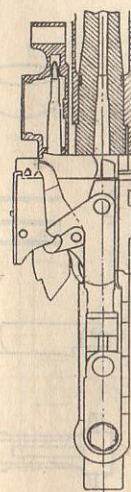


# PLATE IV

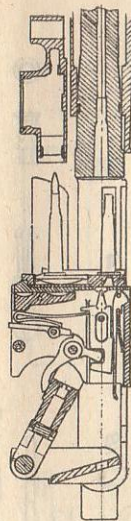


VICKERS .303-IN. M.G., Mk. I

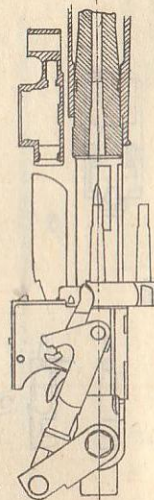
## PLATE V



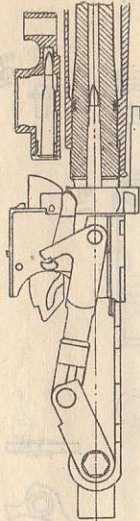
Lock fully home and just fired. Extractor engaging with empty case in chamber and cartridge in feed block.



Lock and barrel recoiling. Extractor withdrawing empty case from chamber and a cartridge from the feed block, firing pin cocked and safety seat engaging.

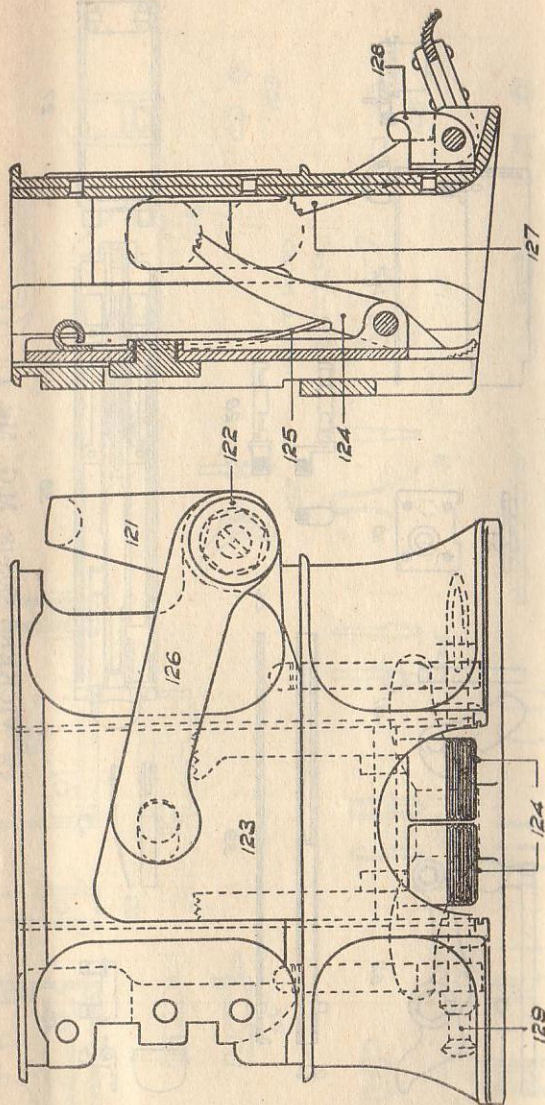


Lock in nearly fully recoiled position. Barrel returning. Extractor down, brings cartridge in line with chamber and empty case either falls off or is pushed off when extractor rises.

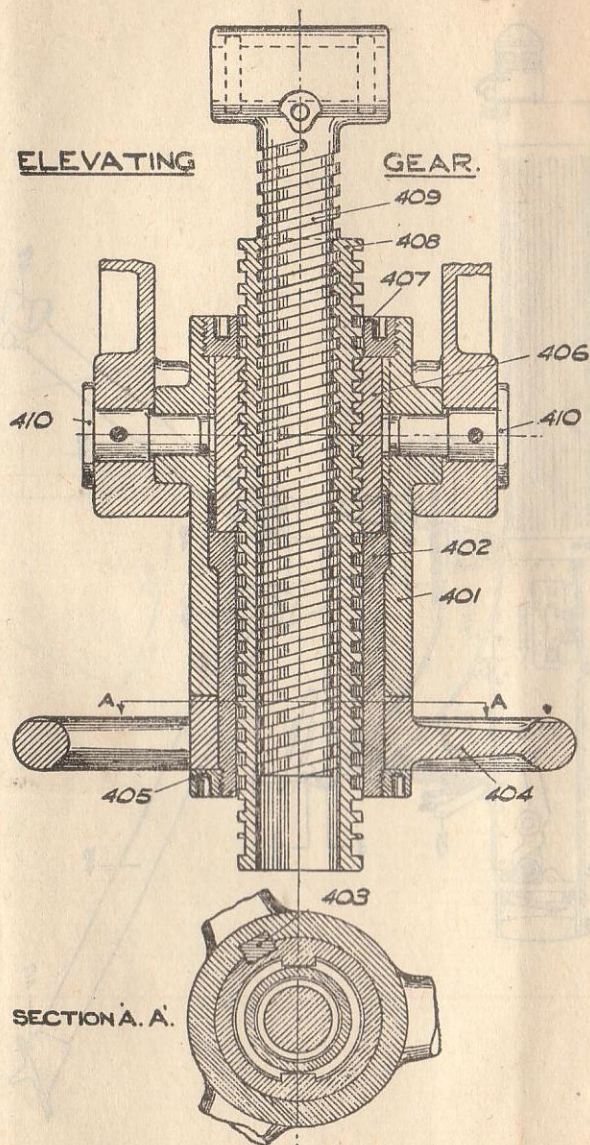


Lock returning, barrel home, extractor being raised by levers, leaving empty case to be ejected, cartridge in chamber, and about to engage with another in the feed block.



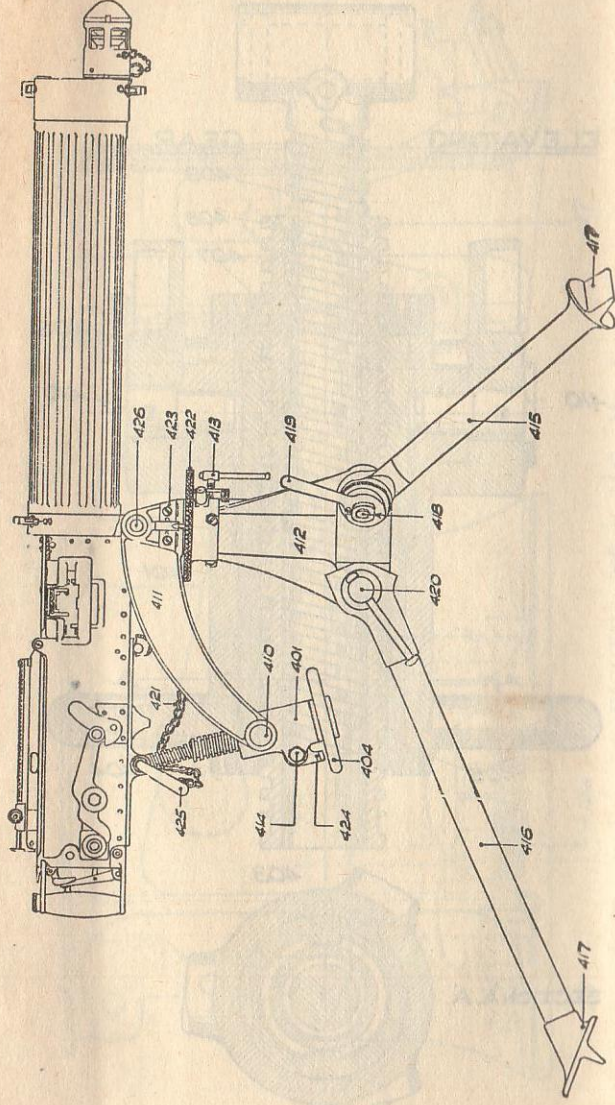


VICKERS .303-IN. M.G., Mk. I



MOUNTING TRIPOD, .303-IN. M.G., Mk. IV

PLATE X



MOUNTING TRIPOD, 303-IN. M.G., MK. IV

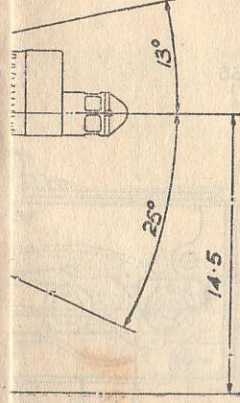
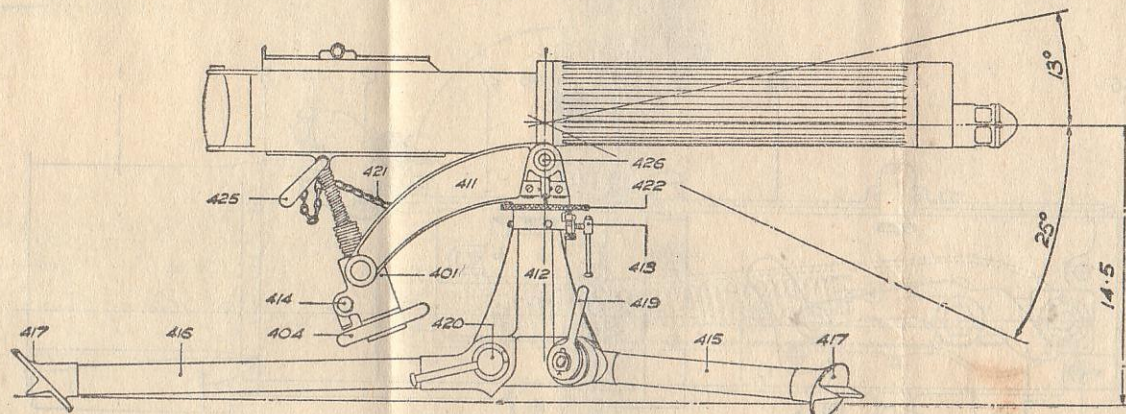
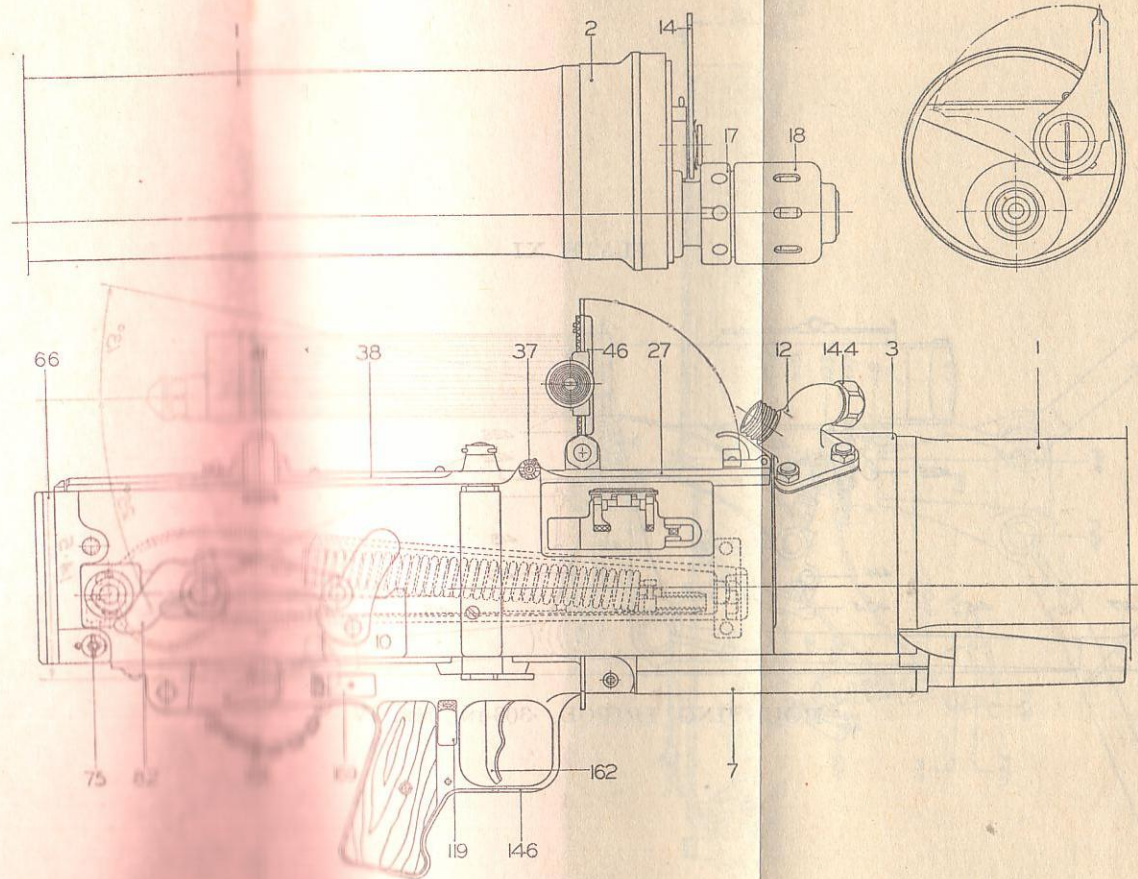


PLATE XI



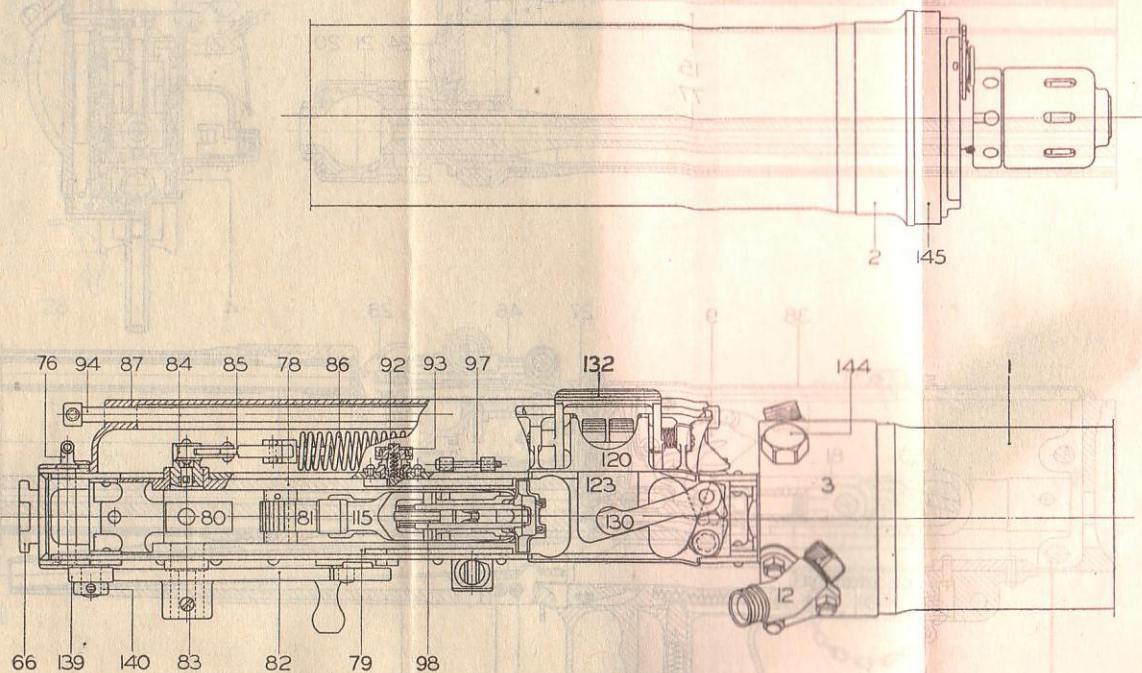
MOUNTING TRIPOD, .303-IN., Mk. IV

PLATE XII



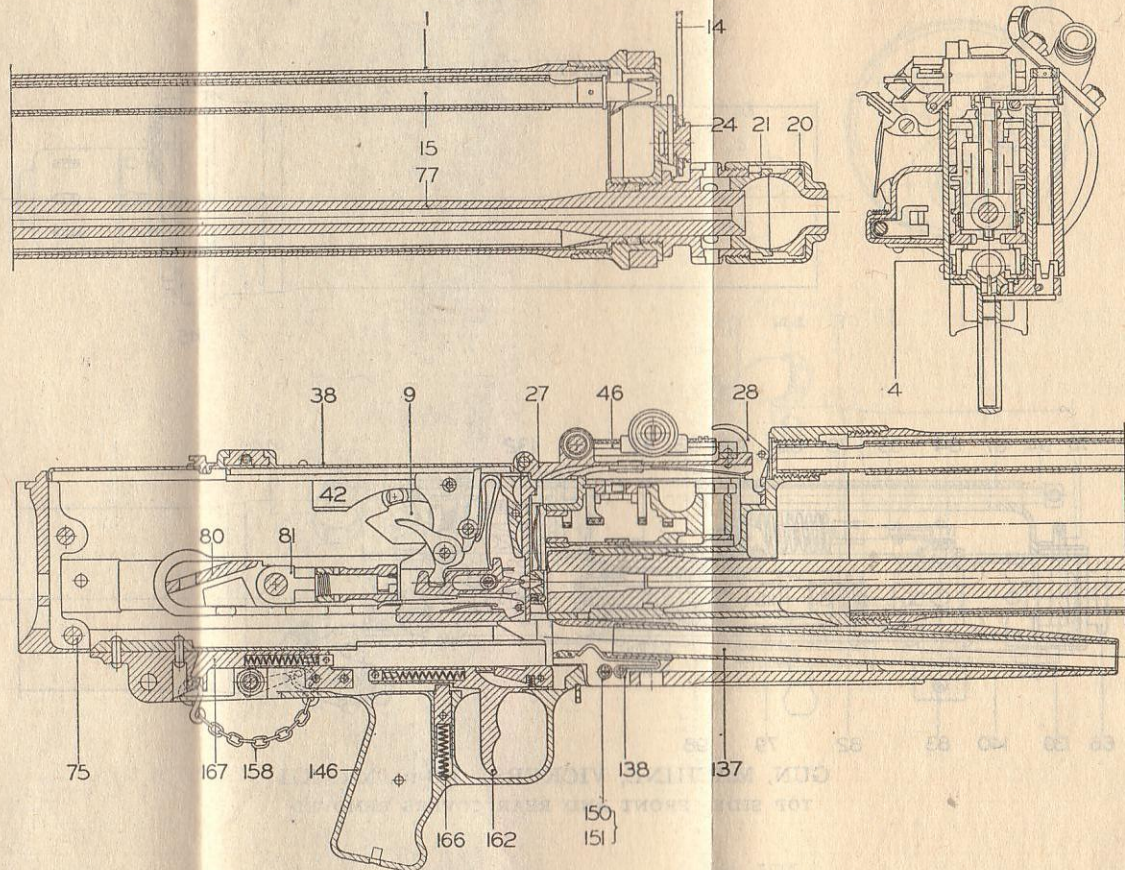
GUN, MACHINE, VICKERS, .303-IN. Mk. VII  
RIGHT SIDE, ELEVATION

PLATE XIII



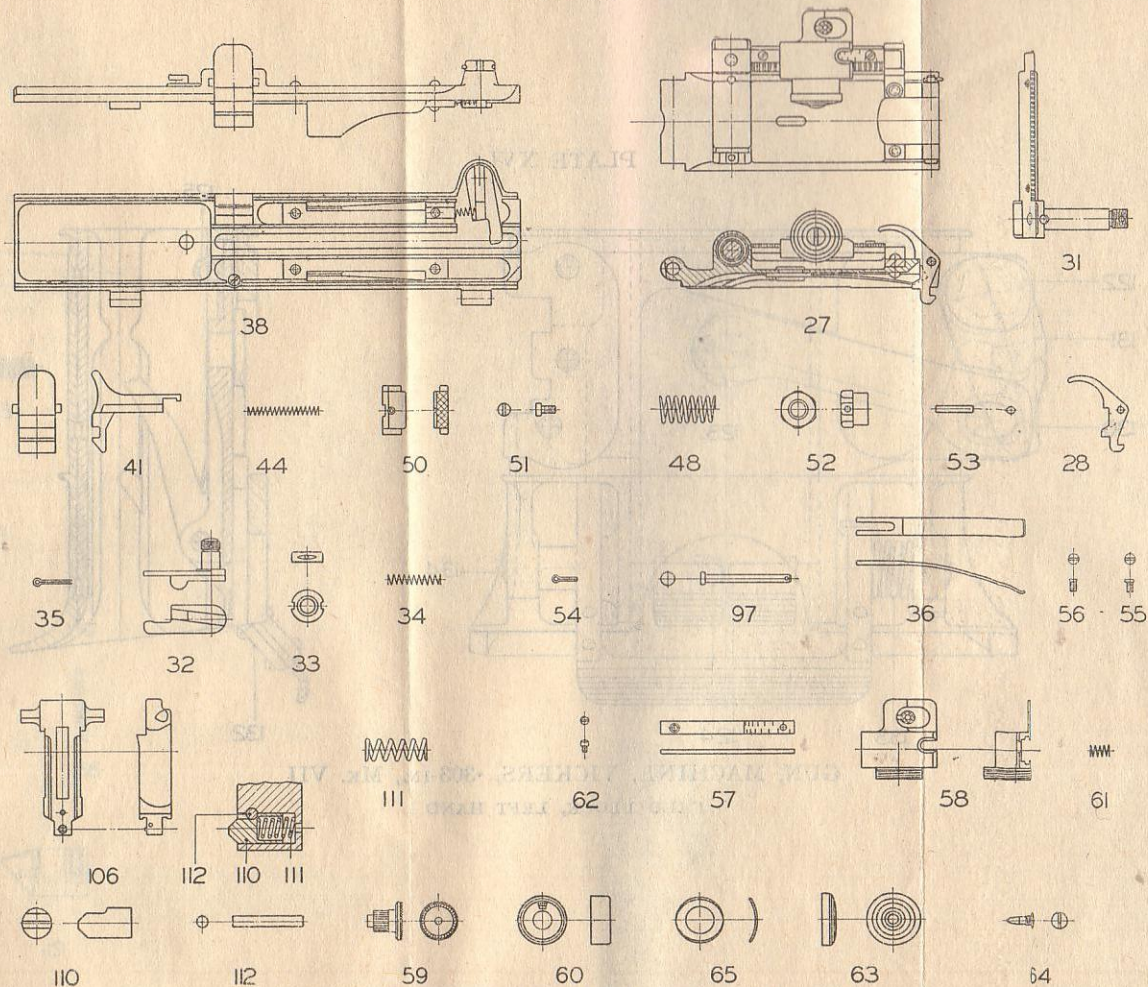
GUN, MACHINE, VICKERS, .303-IN. MK. XII  
TOP SIDE, FRONT AND REAR COVERS REMOVED

PLATE XIV



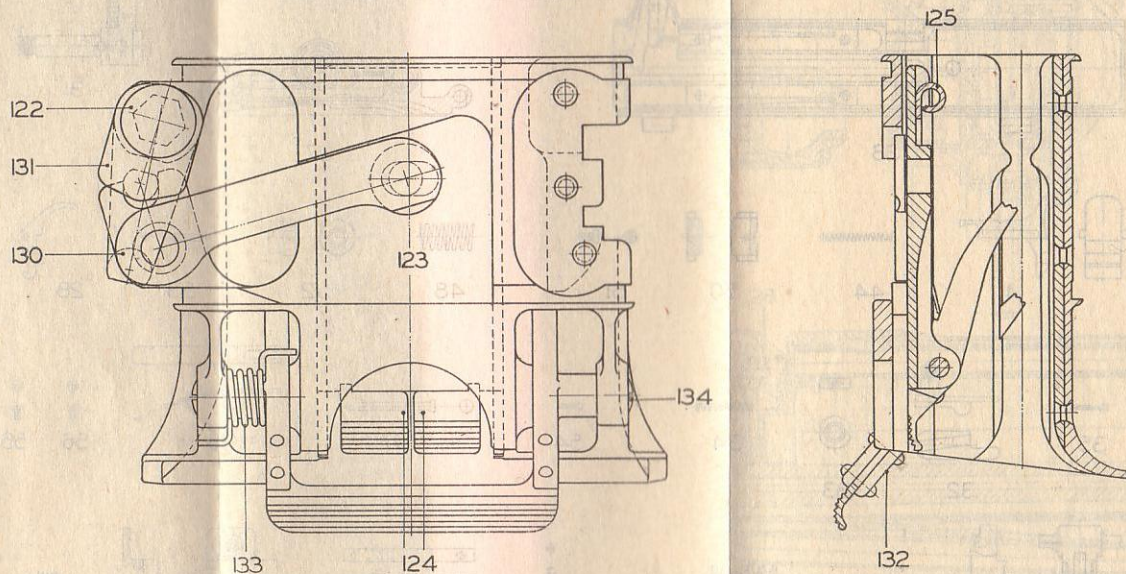
GUN, MACHINE, VICKERS, .303-IN. Mk. VII  
LONGITUDINAL AND CROSS SECTIONS

PLATE XV



GUN, MACHINE, VICKERS, .303-IN., Mk. VII  
DETAILS OF FRONT AND REAR COVERS AND EXTRACTOR

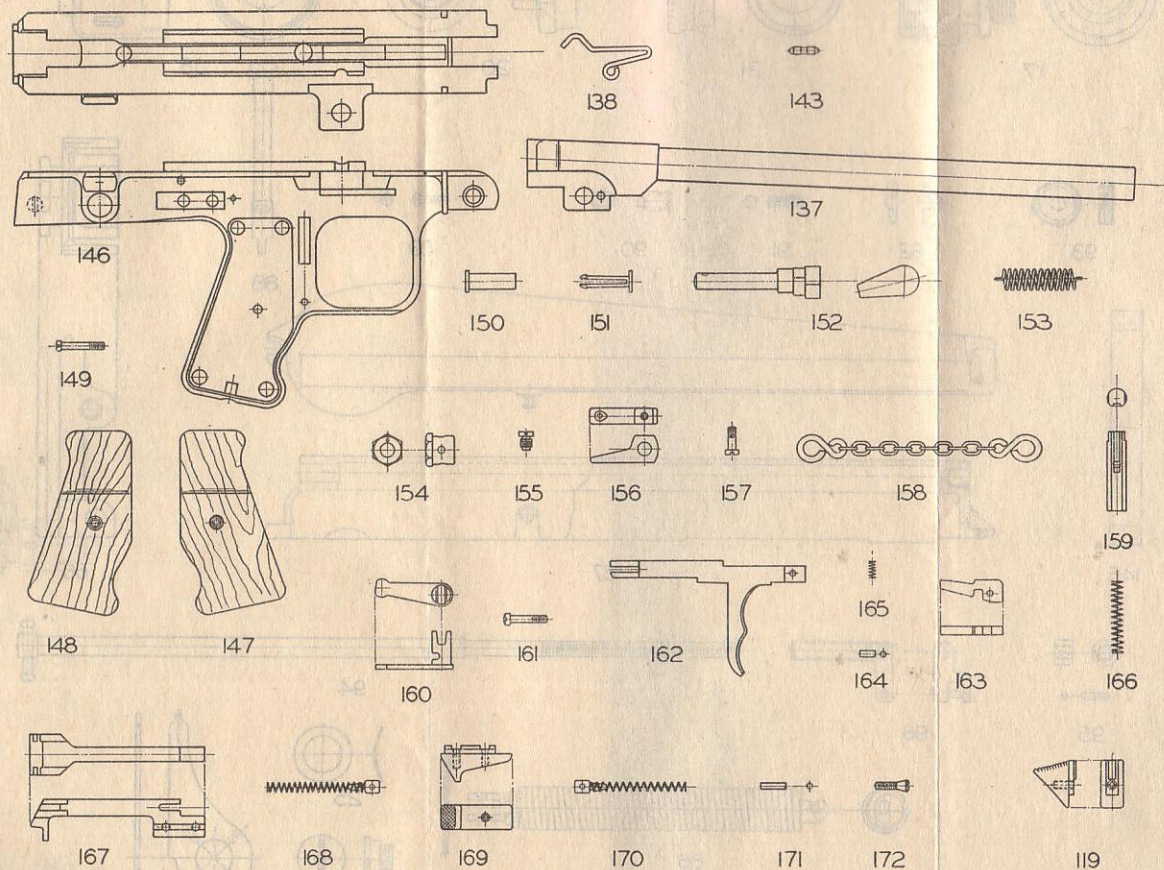
PLATE XVI



GUN, MACHINE, VICKERS, .303-IN., Mk. VII

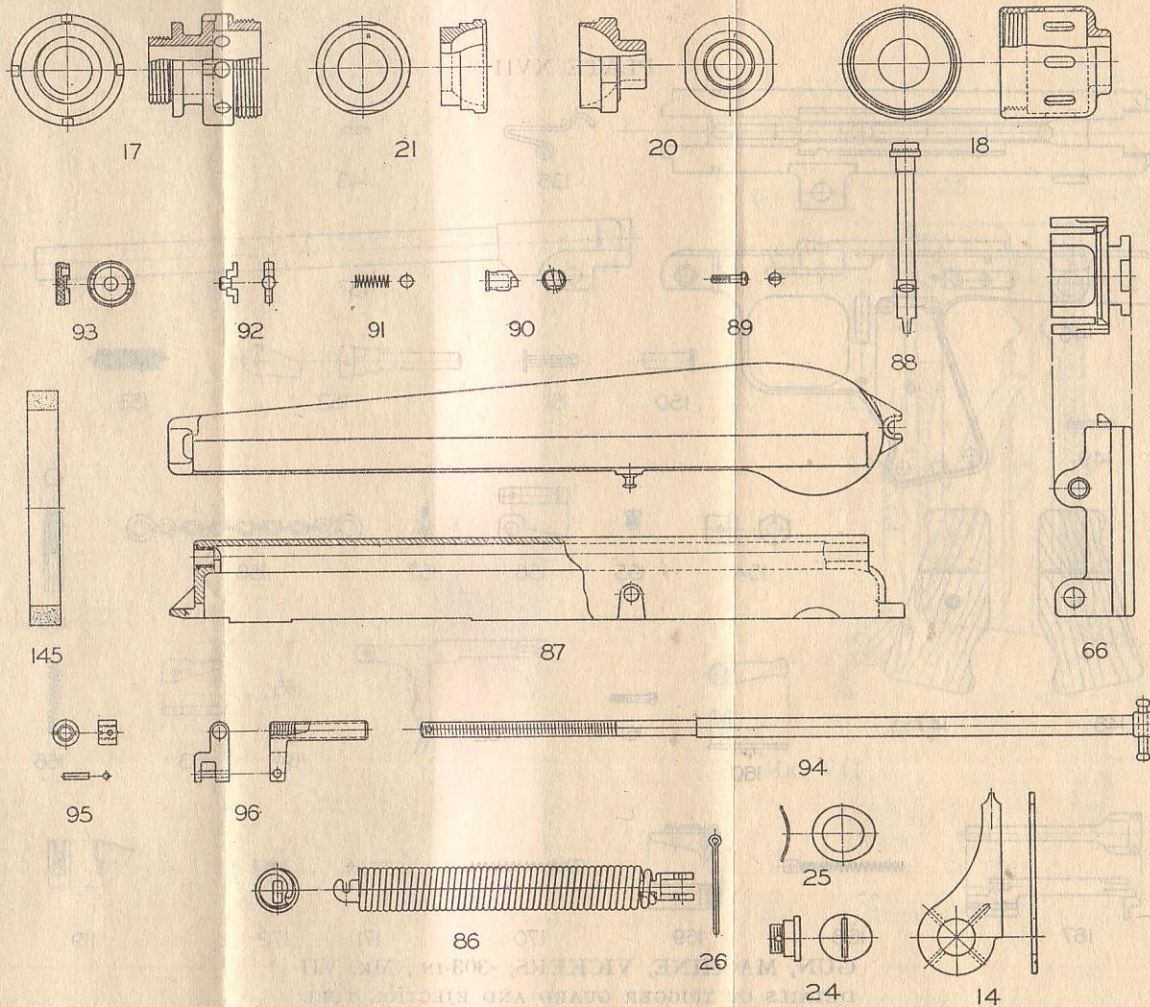
FEED BLOCK, LEFT HAND

PLATE XVII



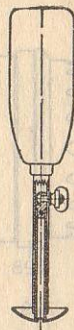
GUN, MACHINE, VICKERS, .303-IN., Mk. VII  
DETAILS OF TRIGGER GUARD AND EJECTION TUBE

PLATE XVIII

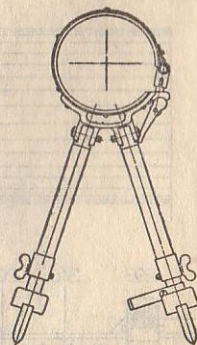


GUN, MACHINE, VICKERS, .303-IN., Mk. VII  
 DETAILS OF MUZZLE ATTACHMENT, FUSEE SPRING BOX, ETC.

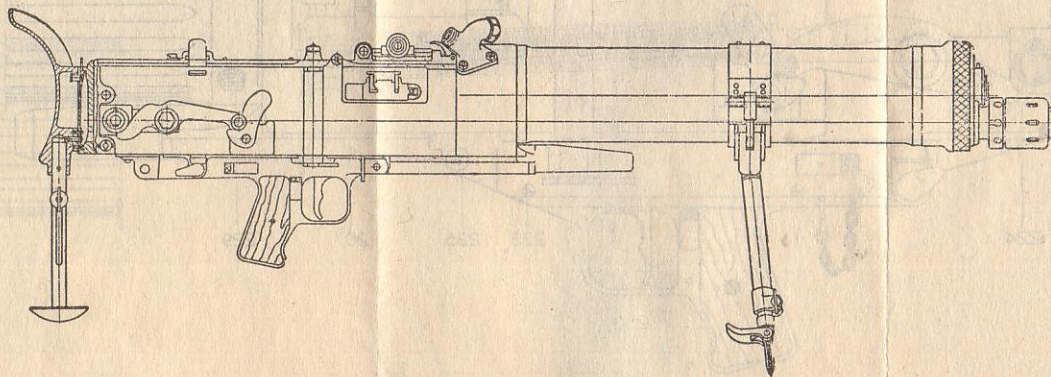
PLATE XIX



LOOKING  
FORWARD



LOOKING  
FORWARD

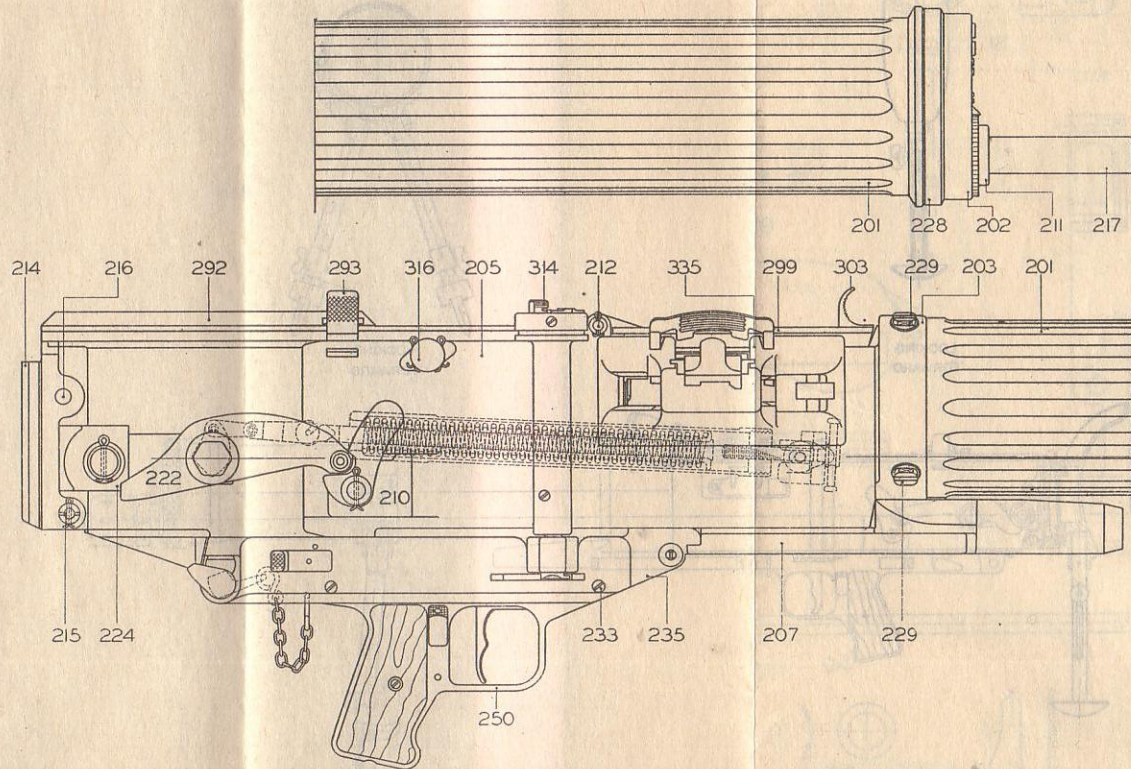


GUN, MACHINE, VICKERS, .303-IN., MK. VII

Mounted on

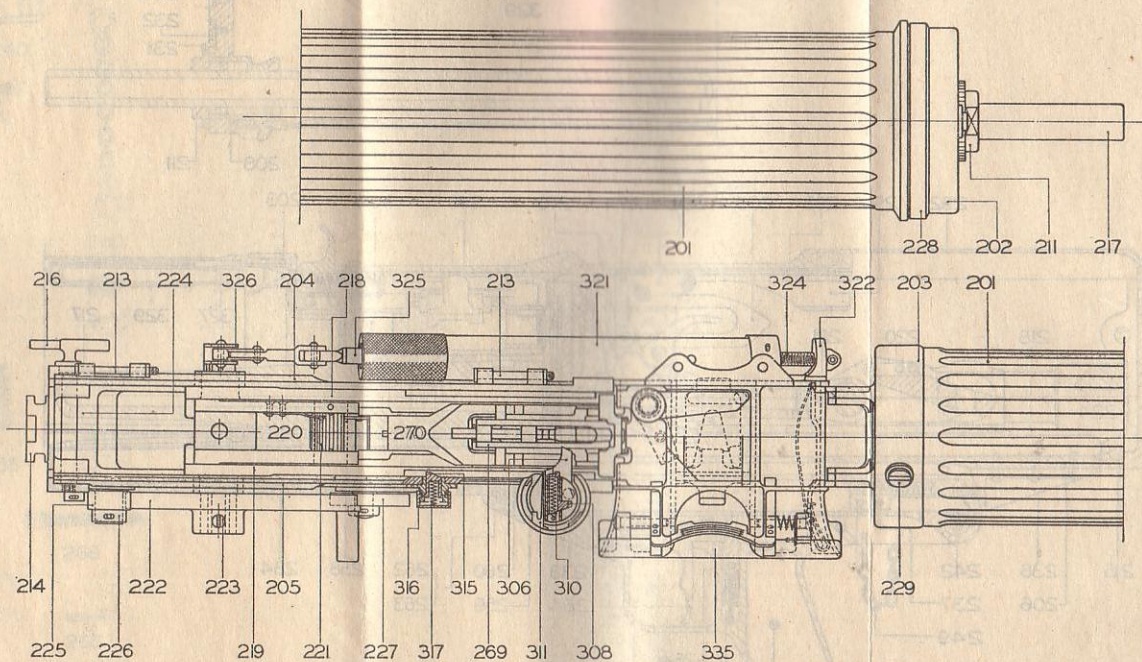
MOUNT, FIELD, VICKERS .303-IN. M.G., MK. I AND SHOULDER-PIECE, M.G., No. 4

PLATE XX



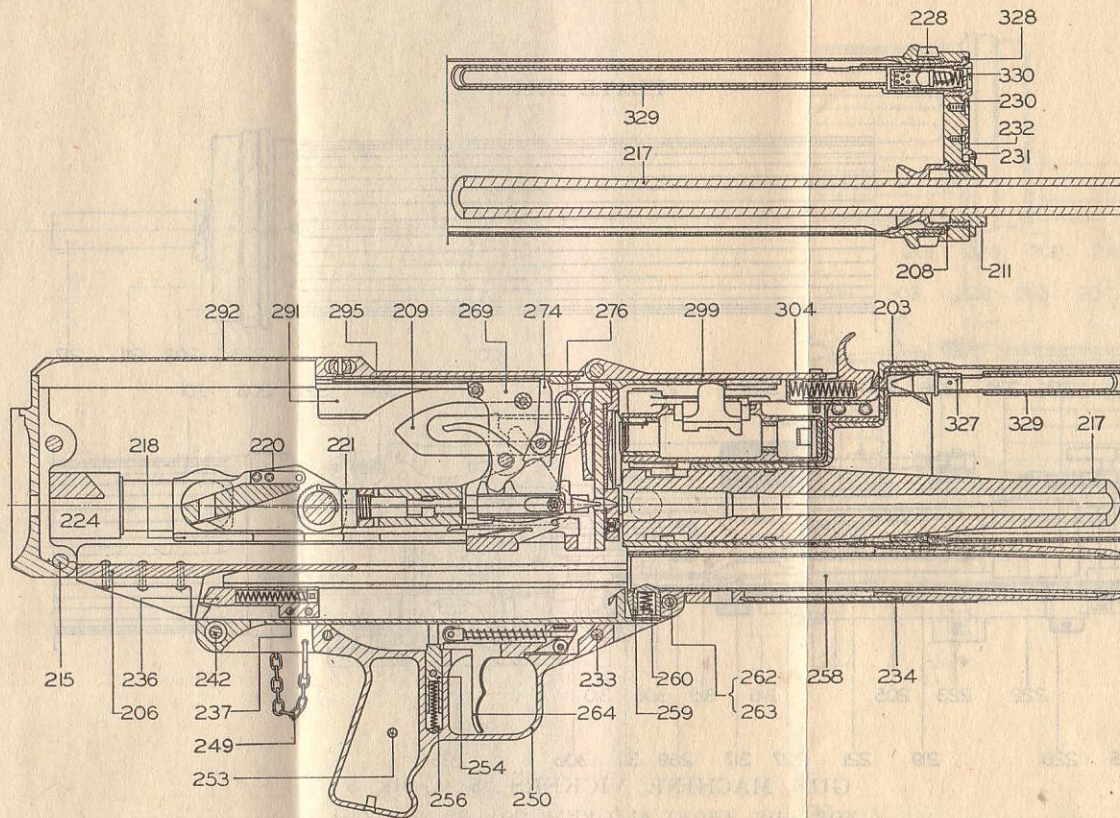
GUN, MACHINE, VICKERS, .5-IN., Mk. V  
RIGHT SIDE, ELEVATION

# PLATE XXI



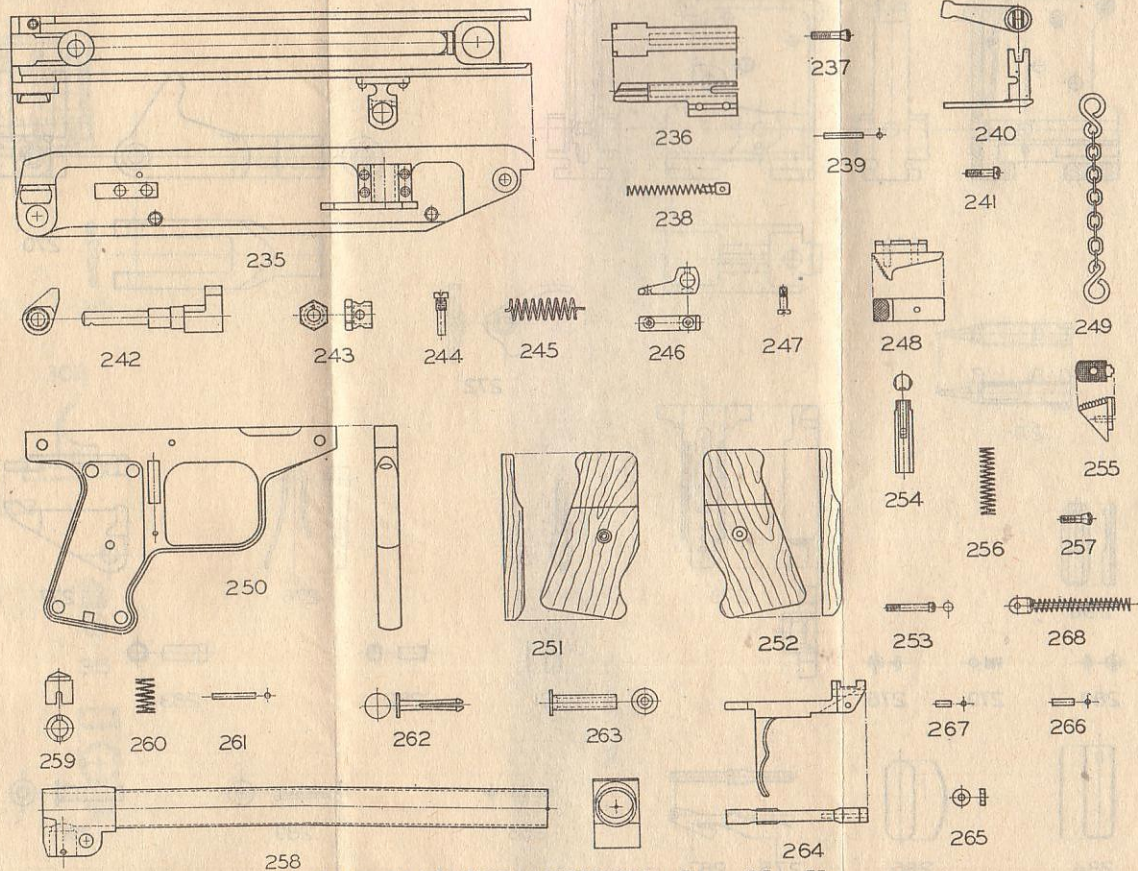
GUN, MACHINE, VICKERS, .5-IN., MK. V  
TOP SIDE, FRONT AND REAR COVERS REMOVED

PLATE XXII



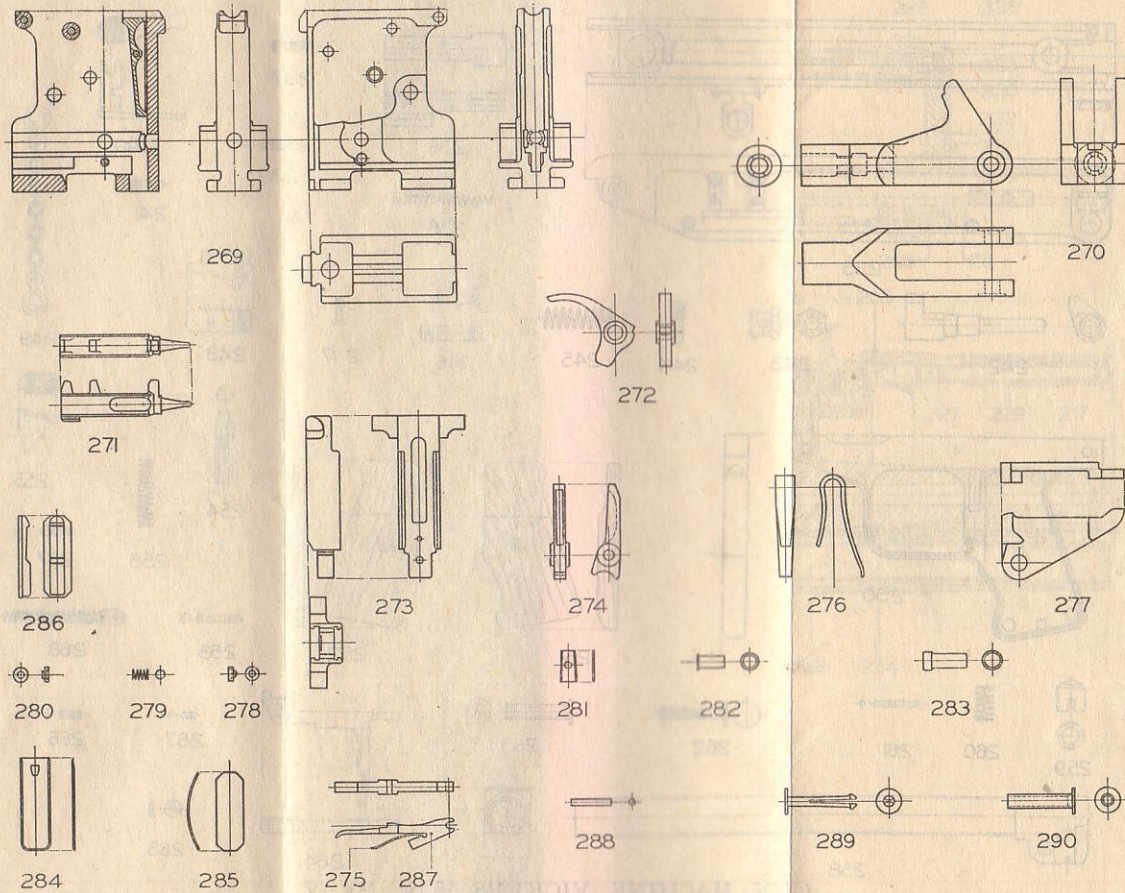
GUN, MACHINE, VICKERS, .5-IN., Mk. V  
LONGITUDINAL SECTION

# PLATE XXIII



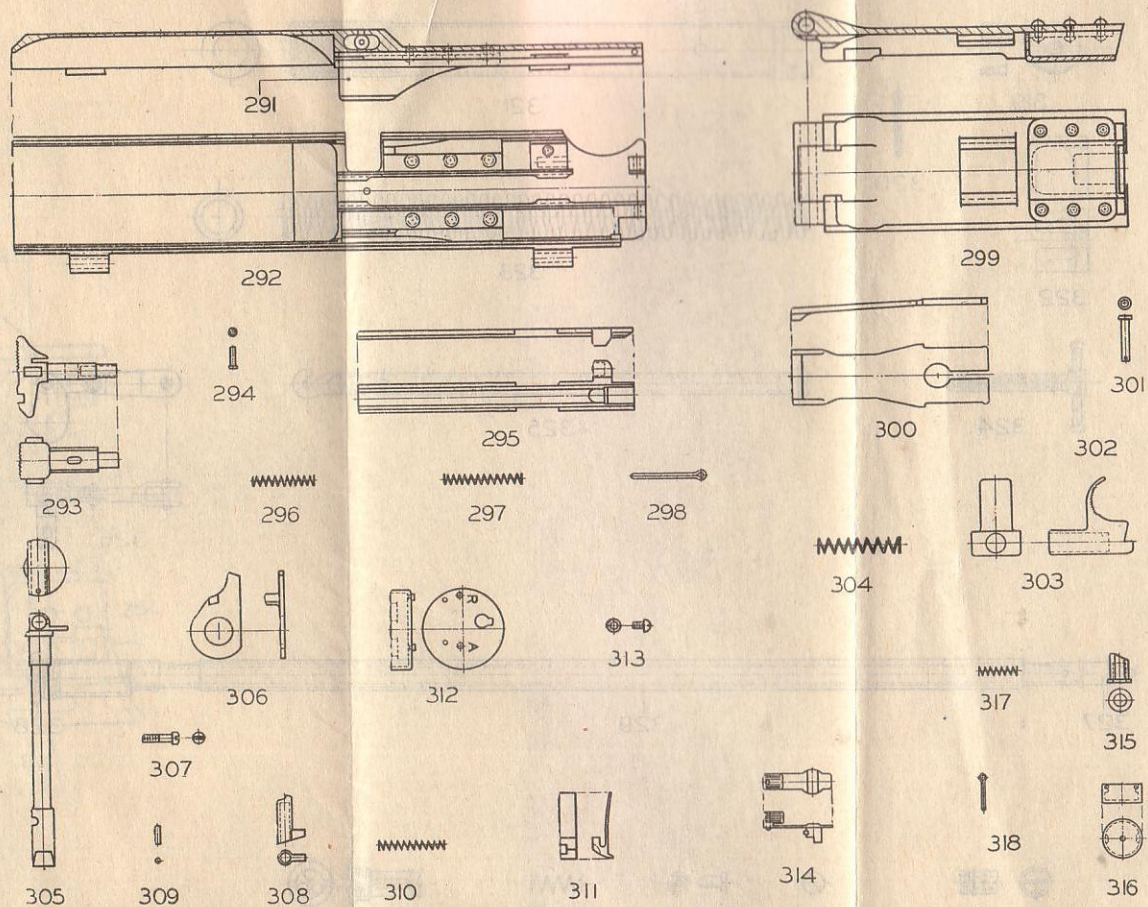
GUN, MACHINE, VICKERS, .5-IN., Mk. V  
TRIGGER GUARD AND EJECTION TUBE

PLATE XXIV



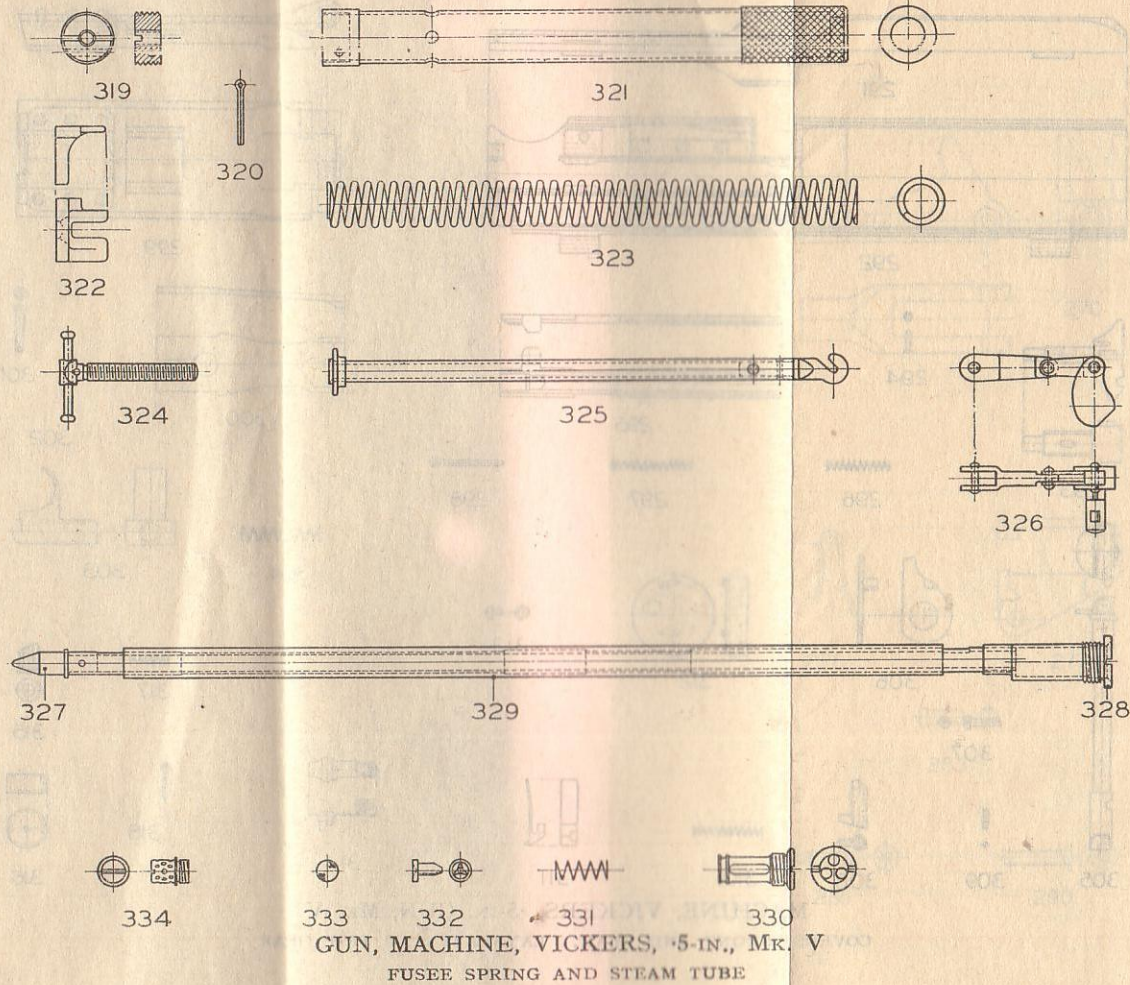
GUN, MACHINE, VICKERS, .5-IN., Mk. V  
LOCK

PLATE XXV



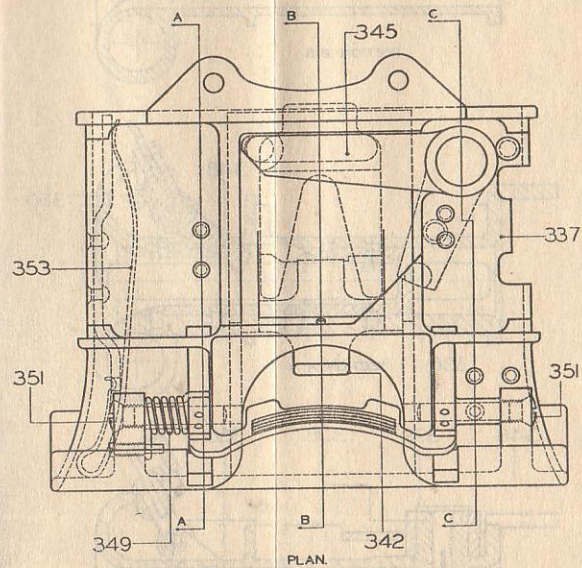
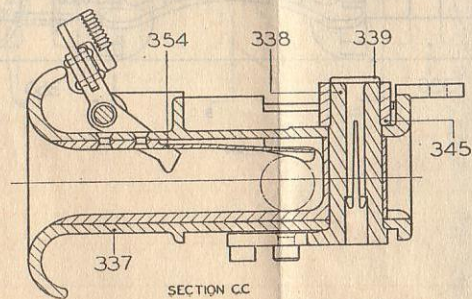
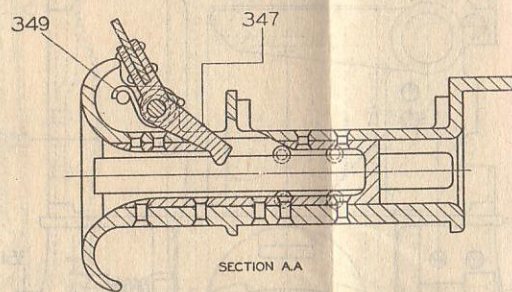
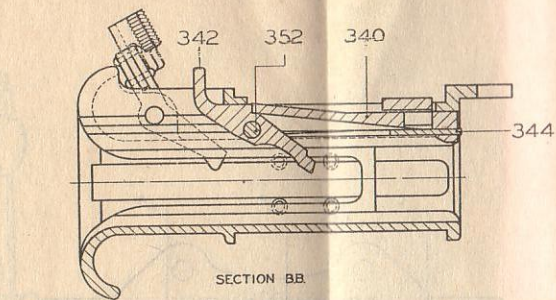
MACHINE, VICKERS, .5-IN. GUN, Mk. V  
COVERS, FRONT AND REAR. LAYSHAFT AND TRIP GEAR

PLATE XXVI



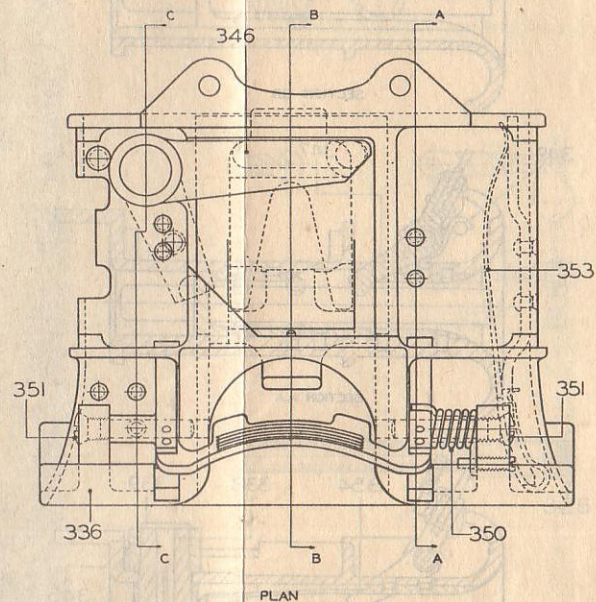
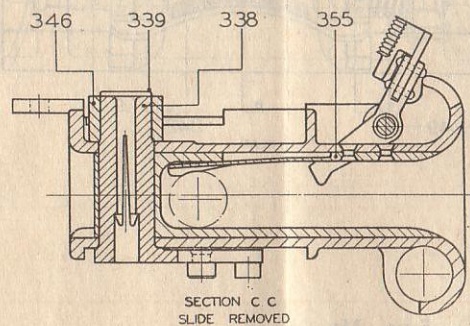
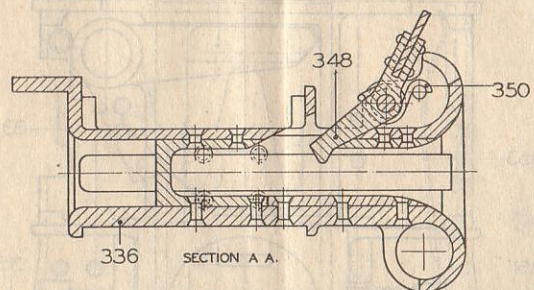
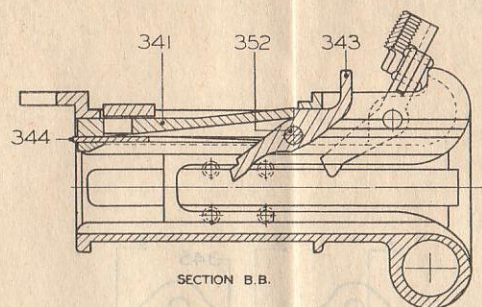
GUN, MACHINE, VICKERS, .5-IN., Mk. V  
FUSEE SPRING AND STEAM TUBE

PLATE XXVII



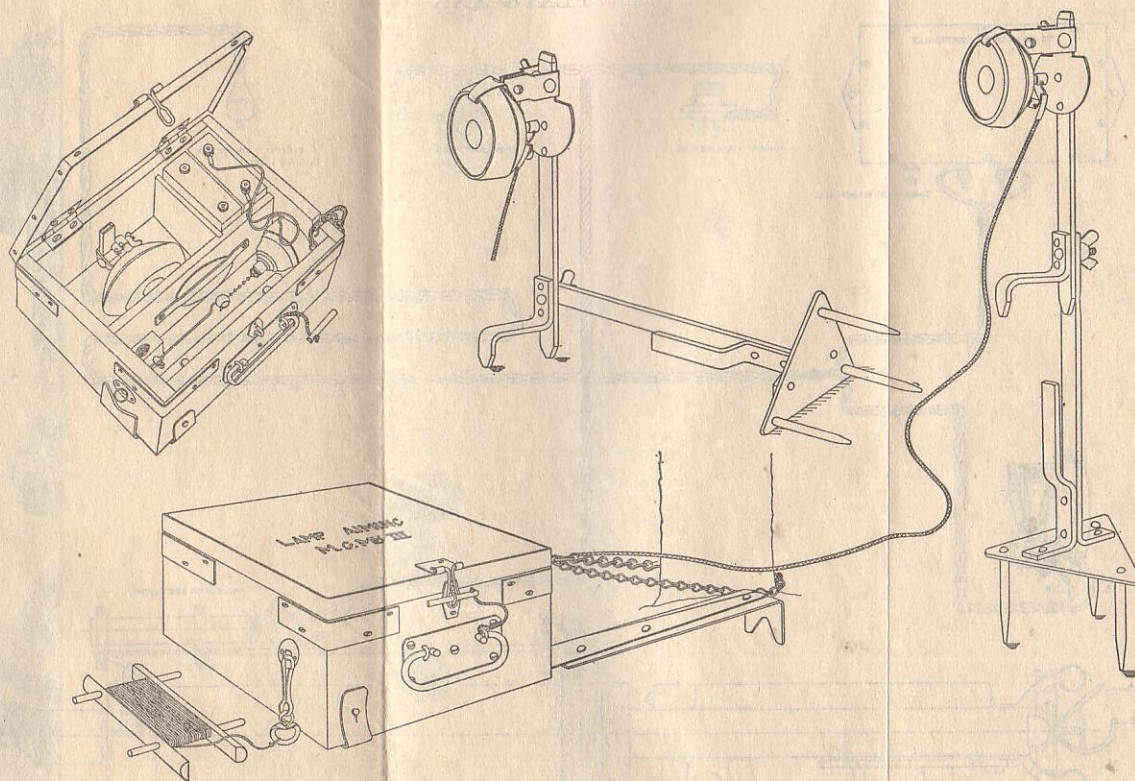
GUN, MACHINE, VICKERS, .5-IN., MK. V  
BLOCK, FEED, LEFT HAND

PLATE XXVIII



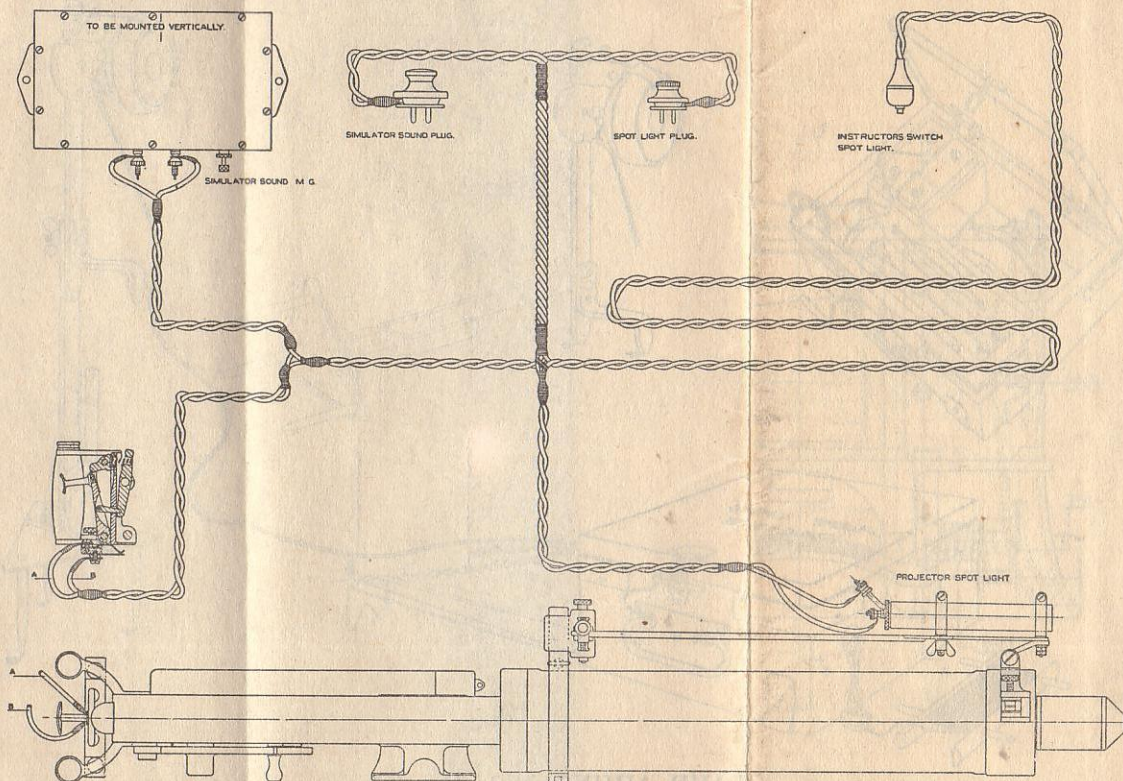
GUN, MACHINE, VICKERS, .5-IN., MK. V  
BLOCK, FEED, RIGHT HAND

PLATE XXIX



LAMP, AIMING, M.G., Mk. III

PLATE XXX



APPARATUS, WEAPON TRAINING, SPOT LIGHT, Mk. II  
FOR VICKES HANDBOOK

PLATE XXXI

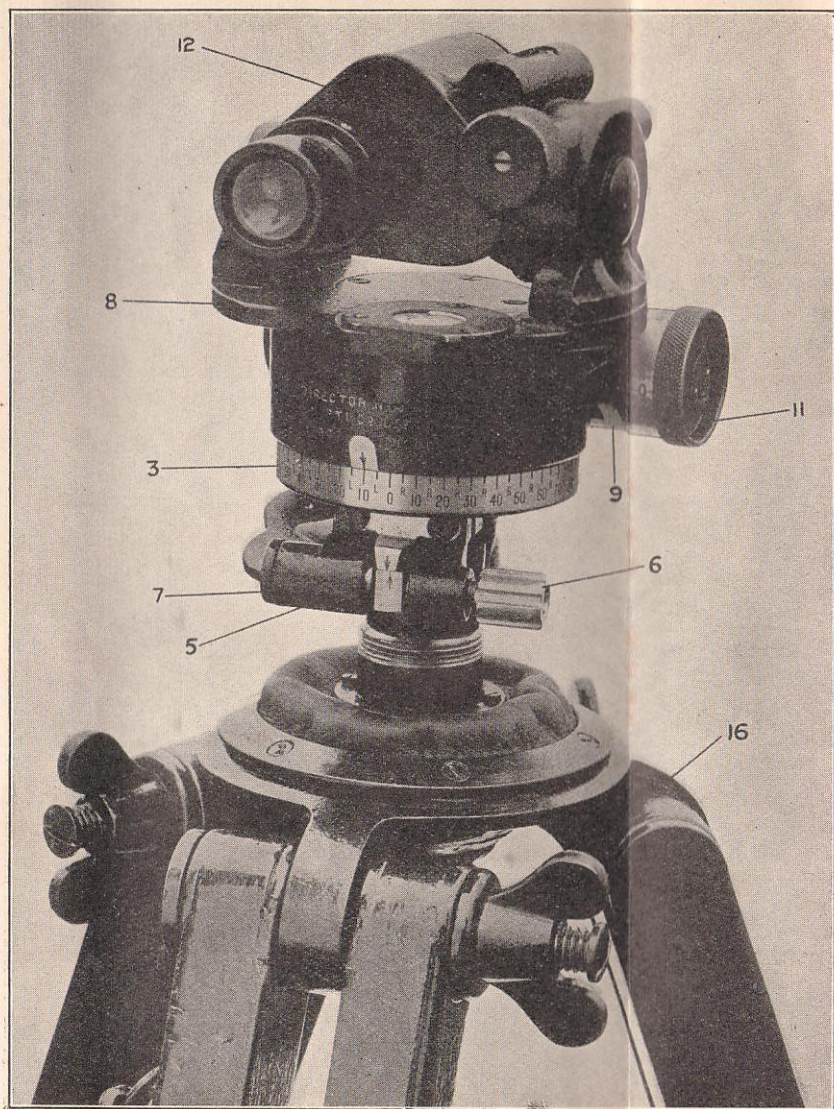


PLATE XXXII

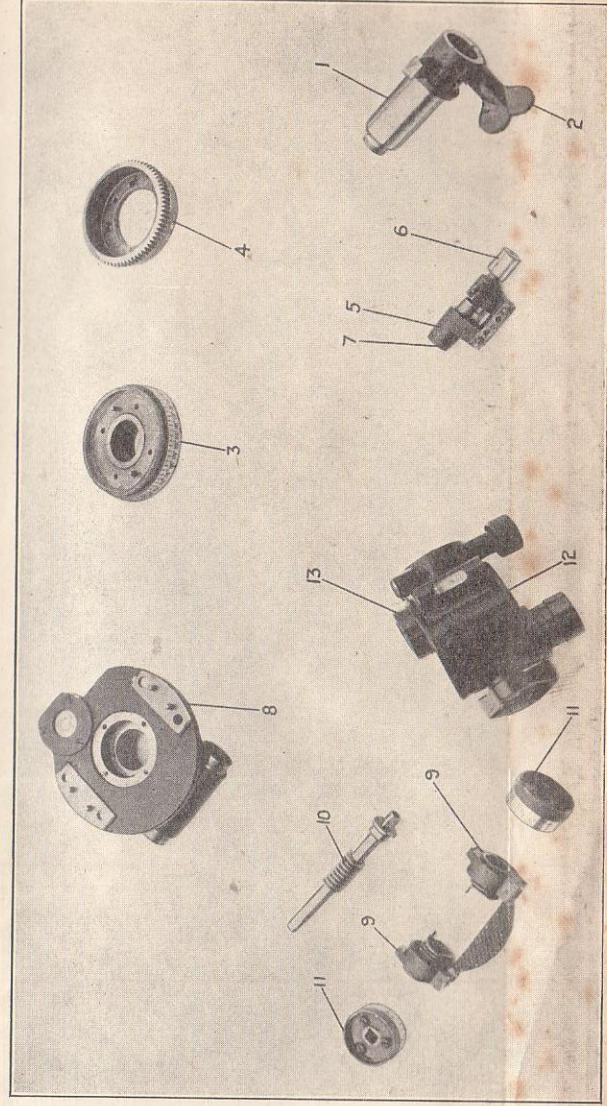


PLATE XXXIII

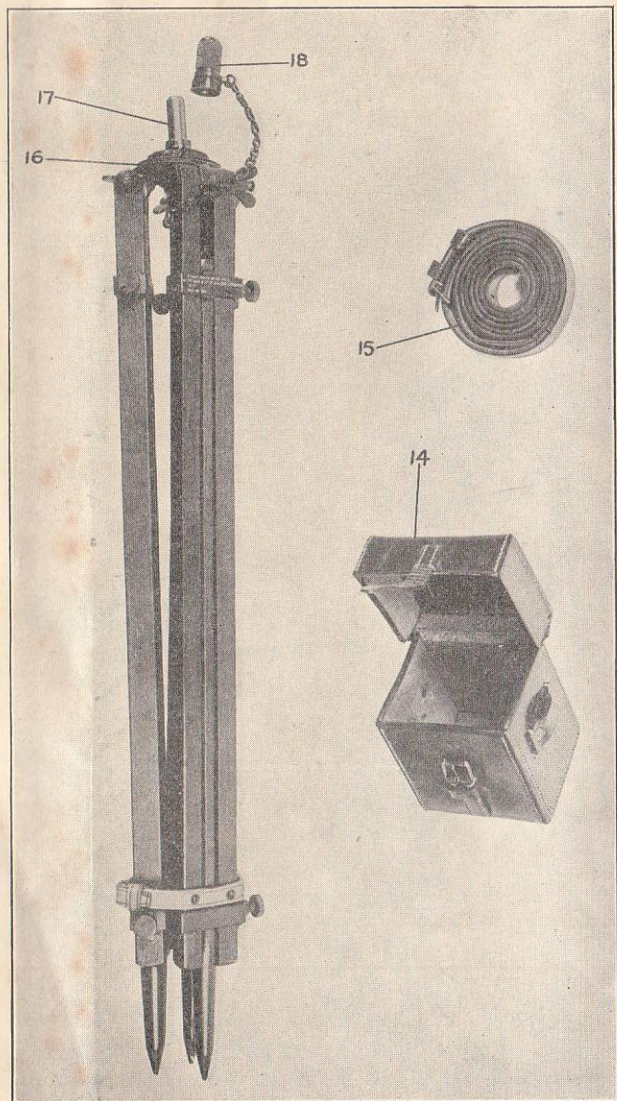
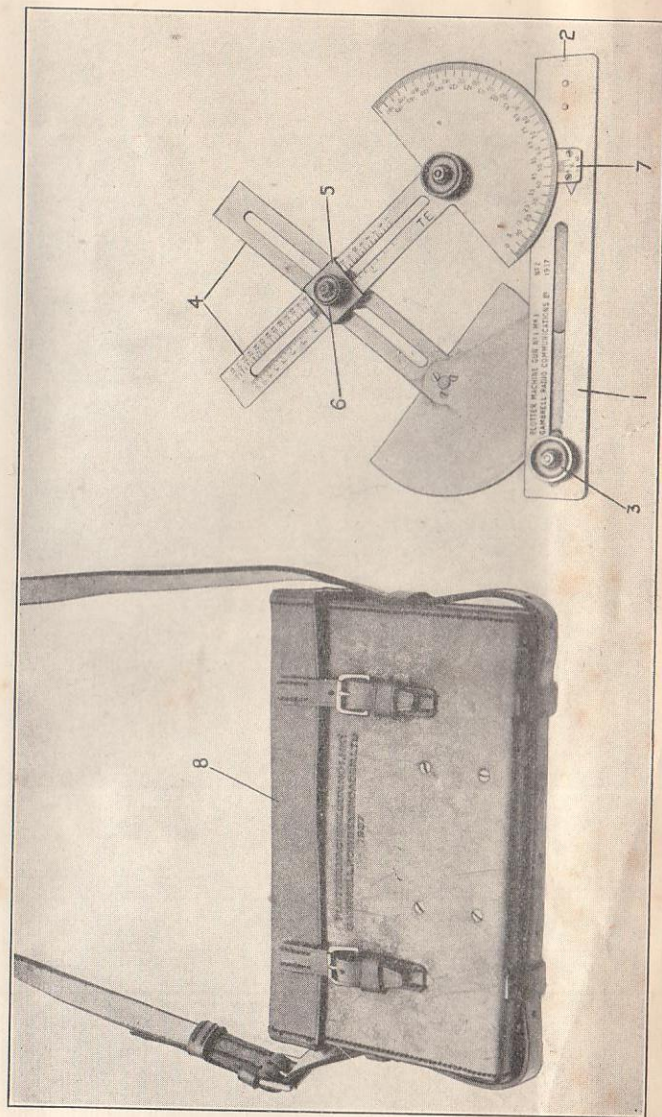


PLATE XXXIV



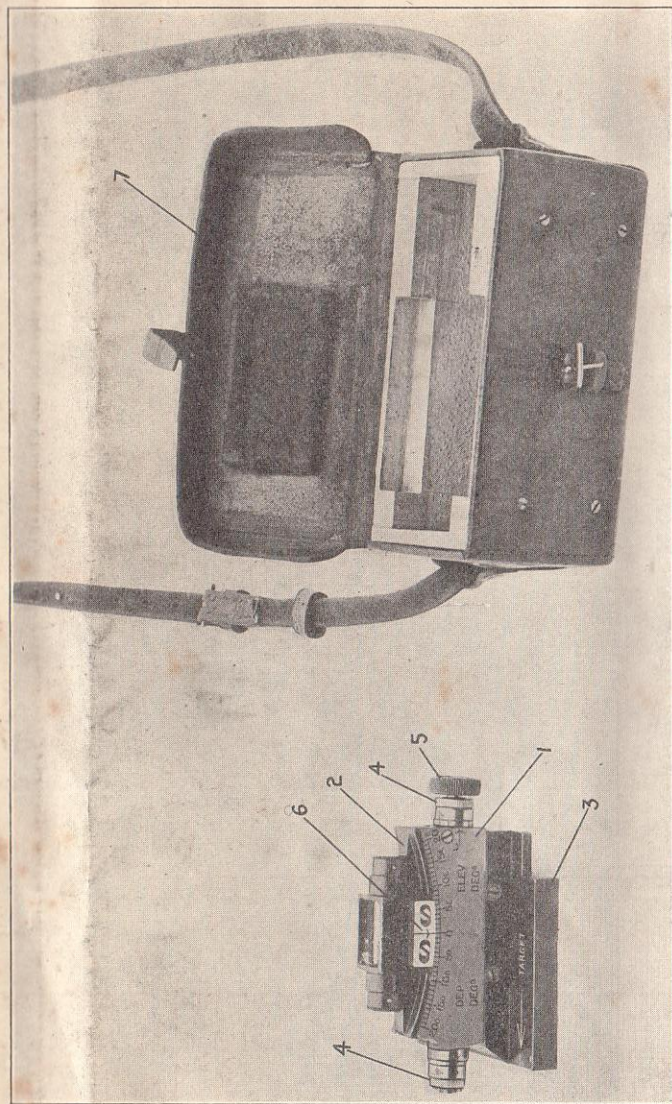
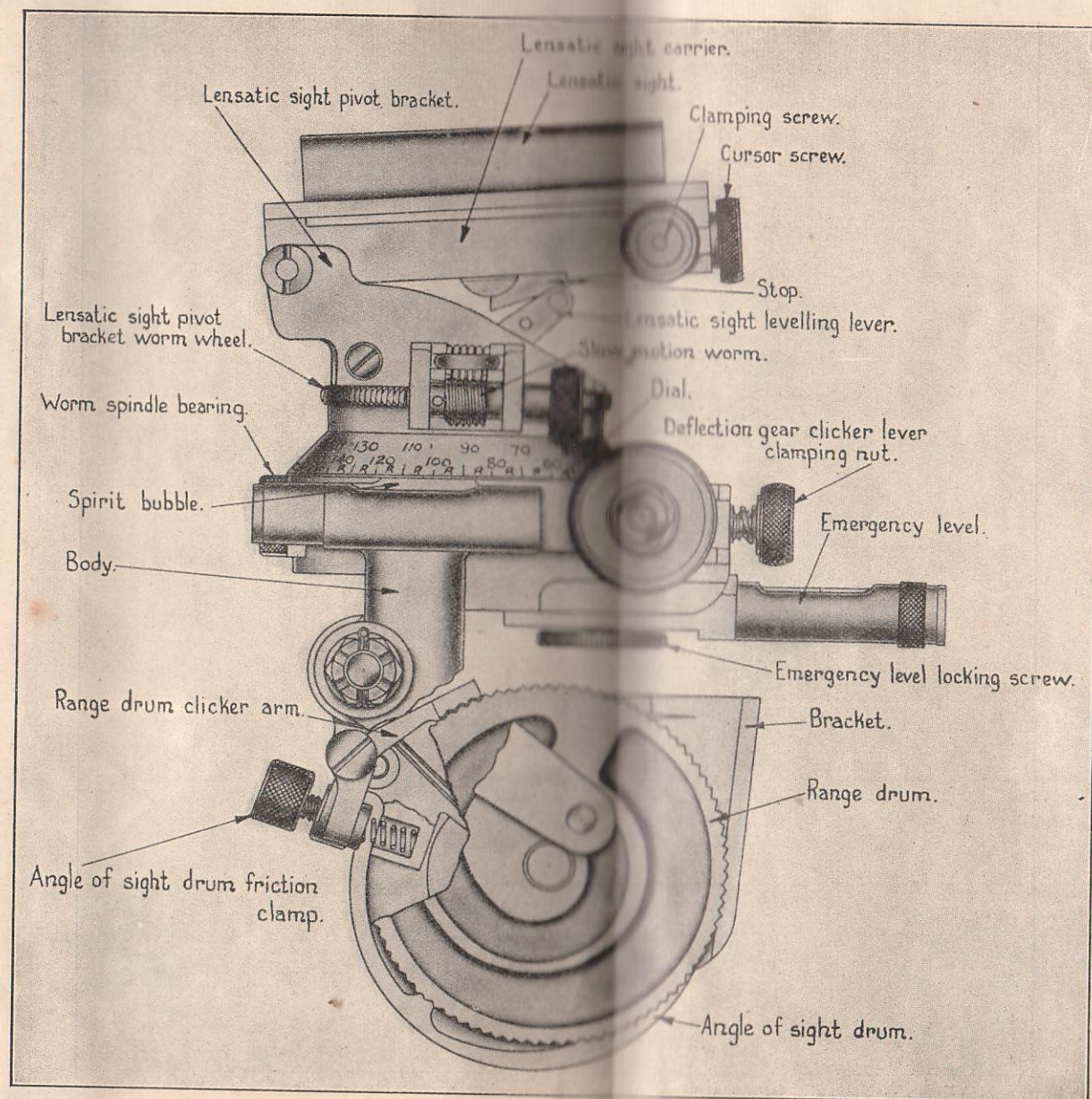
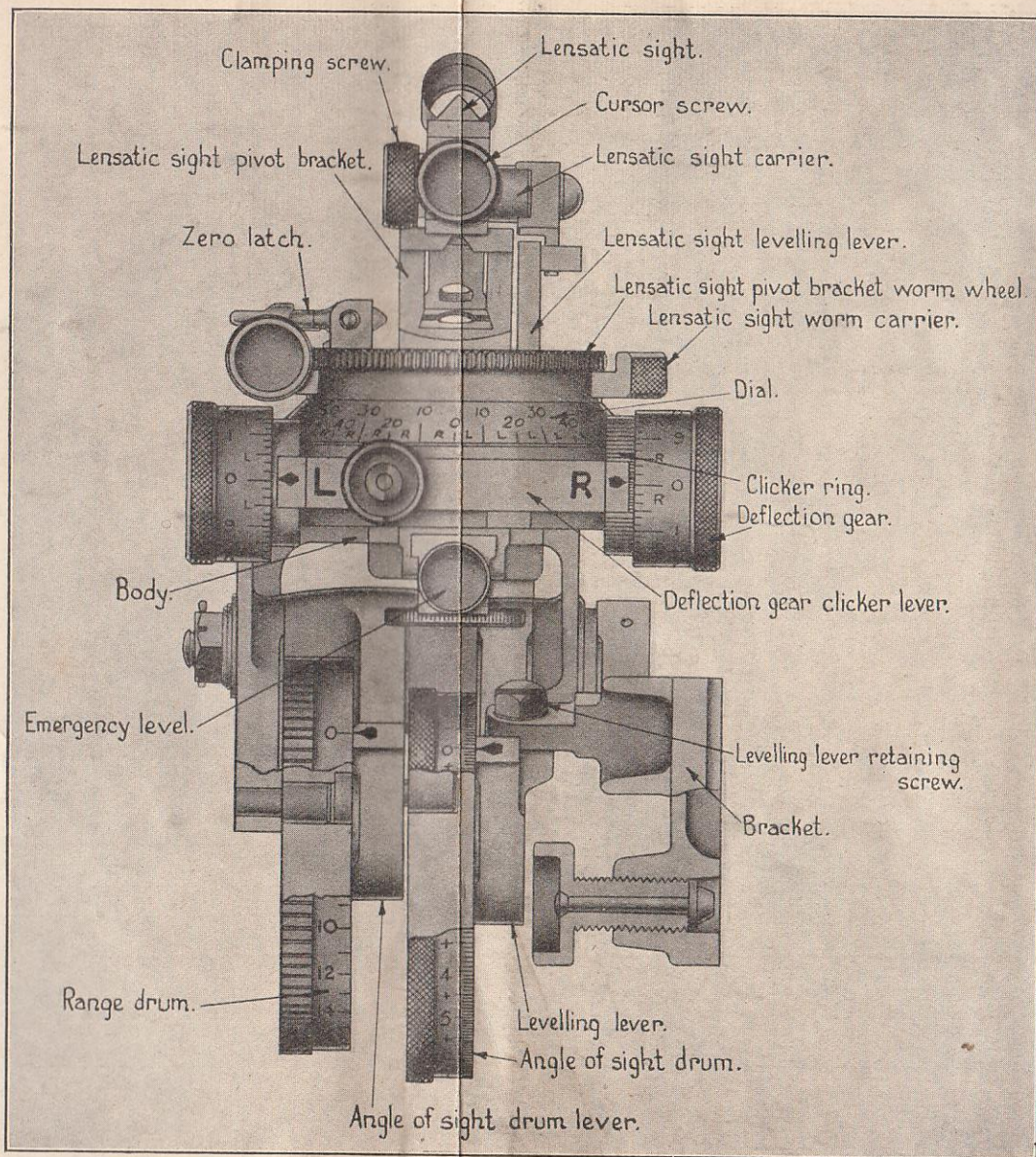
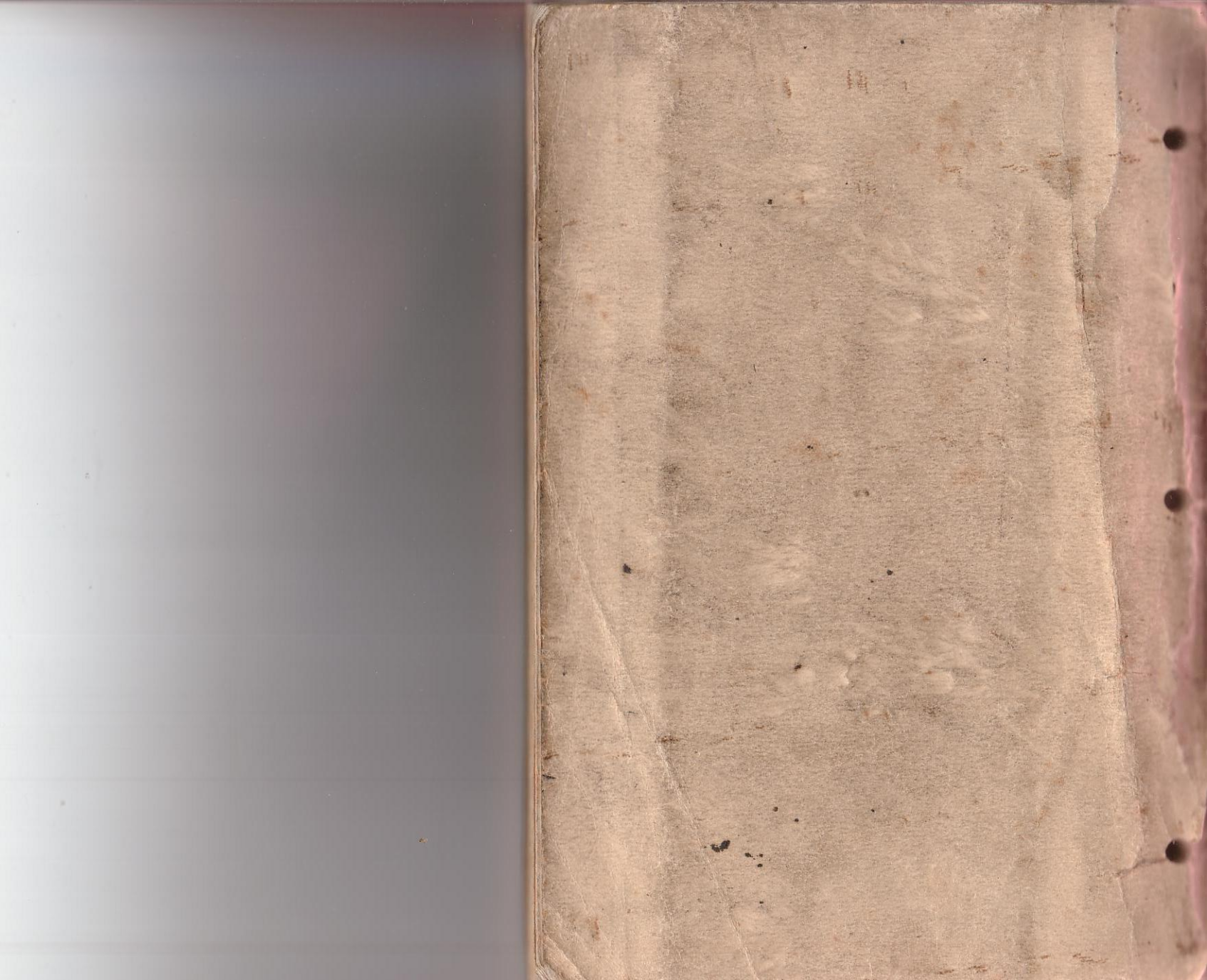


PLATE XXXVI









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